Collecting the xylenes' built-in bonus . . . . p. 32

Chemical Week

April 6, 1957

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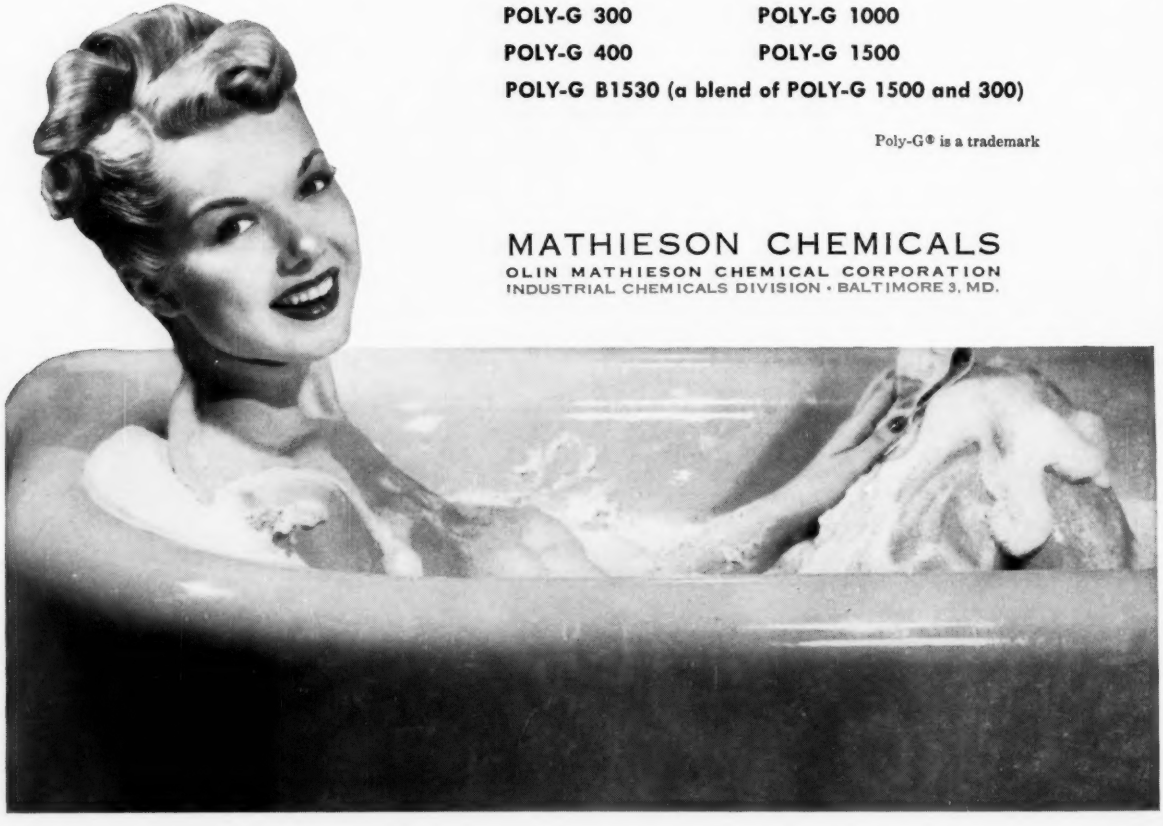

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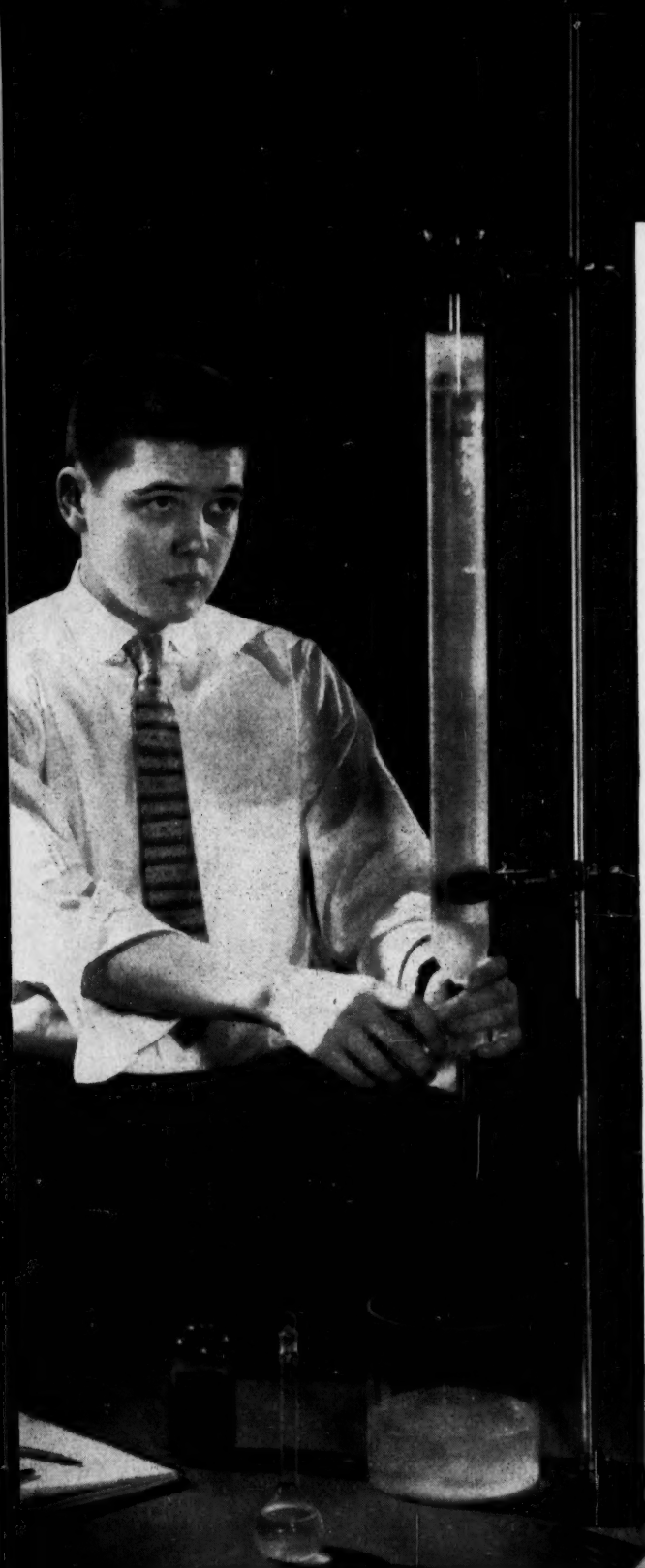

How does a chemist happen?

"New ideas," Henry Thoreau wrote, "come into the world . . . with a flash and an explosion and perhaps somebody's castle roof perforated." Many a budding young chemist has introduced his parents to chemistry in similar fashion. But the real making of a chemist takes place in quiet, unspectacular little ways.

There is the challenge of a teacher who asks two new questions for every one he answers.

There is the mental sweat and labor of working out a quantitative analysis—and the glowing pride of being *right,* to the fourth decimal place.

There is the romance of chemistry written wordlessly in the twinkle of an aging professor's eye.

There is memorizing and mixing . . . calculating and titrating and cramming. Hour upon unending hour of them.

But the hours, the days, the years of work and study silently dissolve in that magic moment when a new idea strikes . . . in that moment when all that *has* been done is forgotten, when all that seems important is to learn if this new thing that has never been done, *can* be done.

In that fleeting moment, the student becomes a scientist and begins for the first time to use chemistry to help people gain a little more comfort, a little extra convenience, a little better health.

It is many such moments, one piled on the other, that create the chemical progress we celebrate this month. Koppers salutes those who have contributed to that progress and those who will contribute more progress in the future. Koppers Company, Inc., Pittsburgh 19, Pennsylvania.

CHEMICAL PROGRESS WEEK
APRIL 8-13

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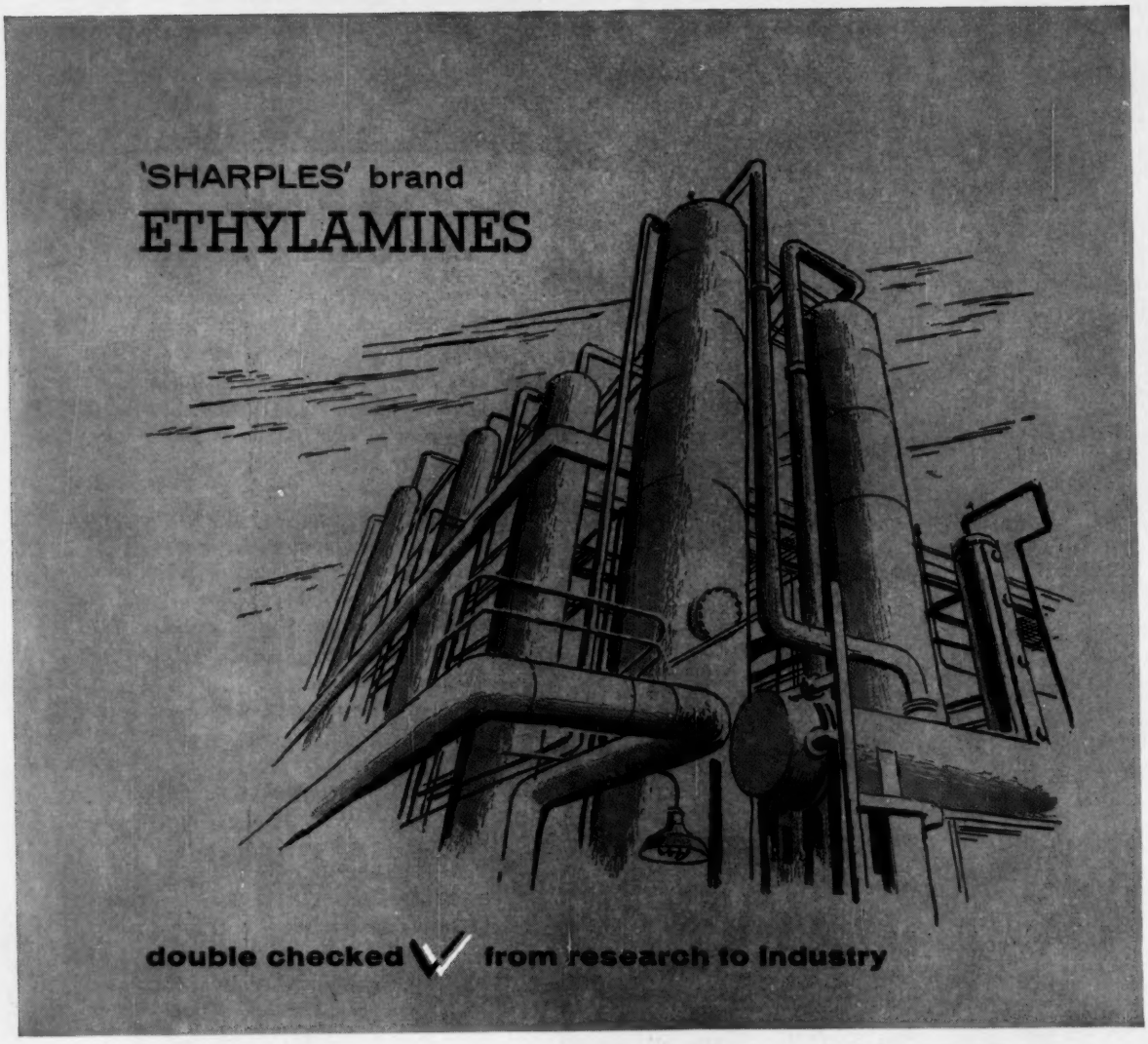
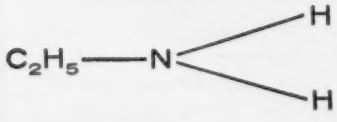
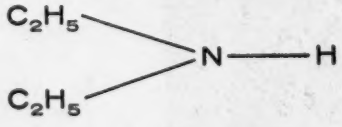


ETHYLAMINE



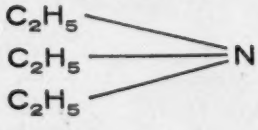
Its many uses include the production of amides, amine salts of sulfonates, modified urea formaldehyde resins and the preparation of salts where improved solubility is desired.

DIETHYLAMINE



Among its varied uses are the manufacture of agricultural chemicals, emulsifiers, pharmaceuticals, amides, vulcanization accelerators, dyestuffs, surface-active agents.

TRIETHYLAMINE



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Chemical Week

Vol. 80, No. 14

TOP OF THE WEEK

April 6, 1957

- **Worker absences due to long illnesses** cost employers $25,000 a year for each 1,000 on the payroll, new survey shows .p. 62
- **Chemical Enterprises gets long-term loan from Dow Chemical,** sees brighter profit hopes in fertilizer distribution ....p. 89
- **New naphthenic extender and magnesium-based stazilizer** is turned up by Shell Development for rubber use with butadiene-styrene rubber .....p. 102
- **Remember Agfa photo film? It's back again** in America. Here's how it's being re-established .....p. 124

Chemical Week

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APRIL 6, 1957 **VOL. 80, NO. 14**

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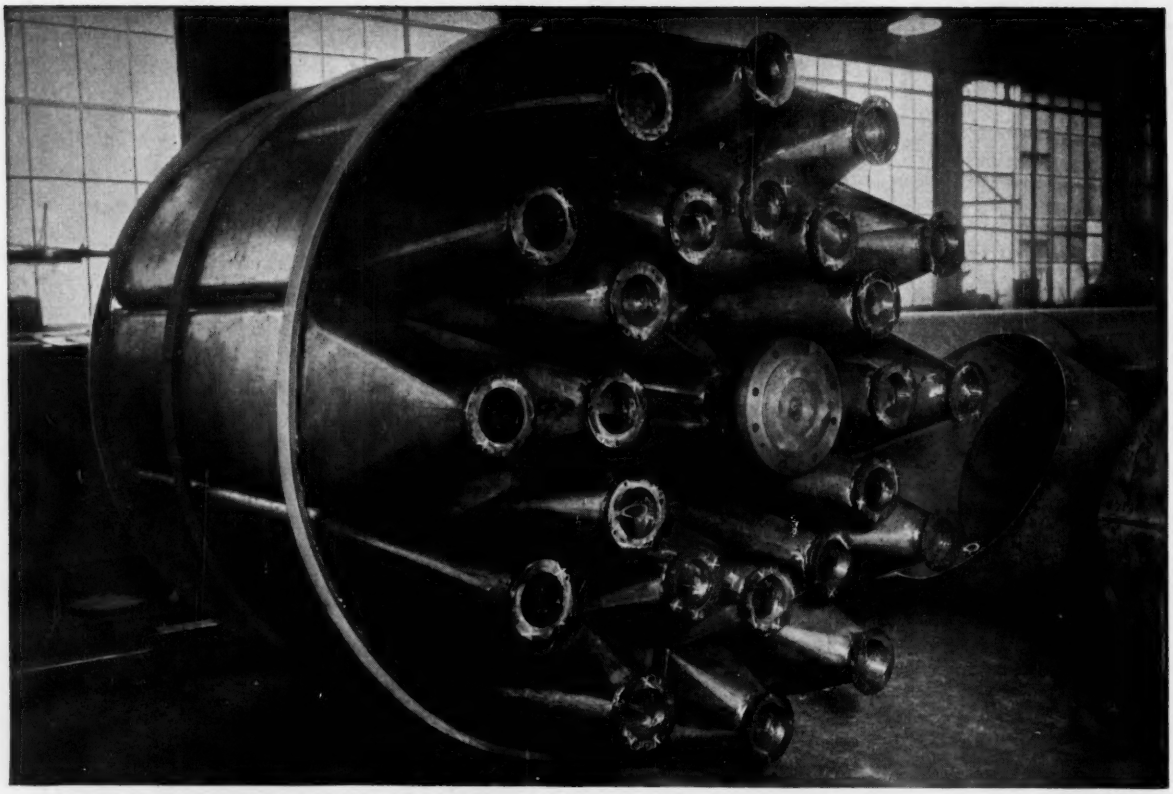


Hot magnesium-carbonate slurry presents no corrosion problem when handled by the unit shown here. Made of chromium-nickel stainless steel throughout, this 24-duct indexing hopper for a manufacturer of pipe insulation is an example of all stainless process equipment fabricated by Stainless Products, Inc., Jersey City, N. J.

Chromium-nickel stainless frees hopper from trouble facing many process units

ONE HAZARD that operators face every day is *corrosion.*

As in other processing units, corrosion of an indexing hopper endangers product purity, inflicts expense for maintenance or repair and stops output during the downtime.

But the hopper above, made entirely of chromium-nickel stainless, faces no such trouble. Because ability to thwart attacks by a wide variety of corrosives is a basic characteristic of austenitic chromium-nickel stainless steels.

Helps in other ways, too

In addition, the high mechanical properties of stainless steels allow designers to cut bulk and deadweight without sacrificing strength or safety of process equipment.

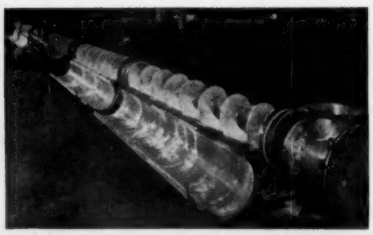
Fortified with Nickel, these steels withstand impact and battering, abrasion and erosion. They resist creep and oxidation at elevated temperatures, and retain high strength, toughness and freedom from "notch" effects, to below –400°F.

Easy to clean and keep clean, chromium-nickel stainless steels are sanitary metals that minimize maintenance.

Readily fabricated

Fabricators draw, spin, forge and solder stainless. They punch, shear, bend and weld this versatile material. Leading steel companies produce austenitic chromium-nickel stainless steels in all commercial forms. So investigate use of stainless steel equipment.

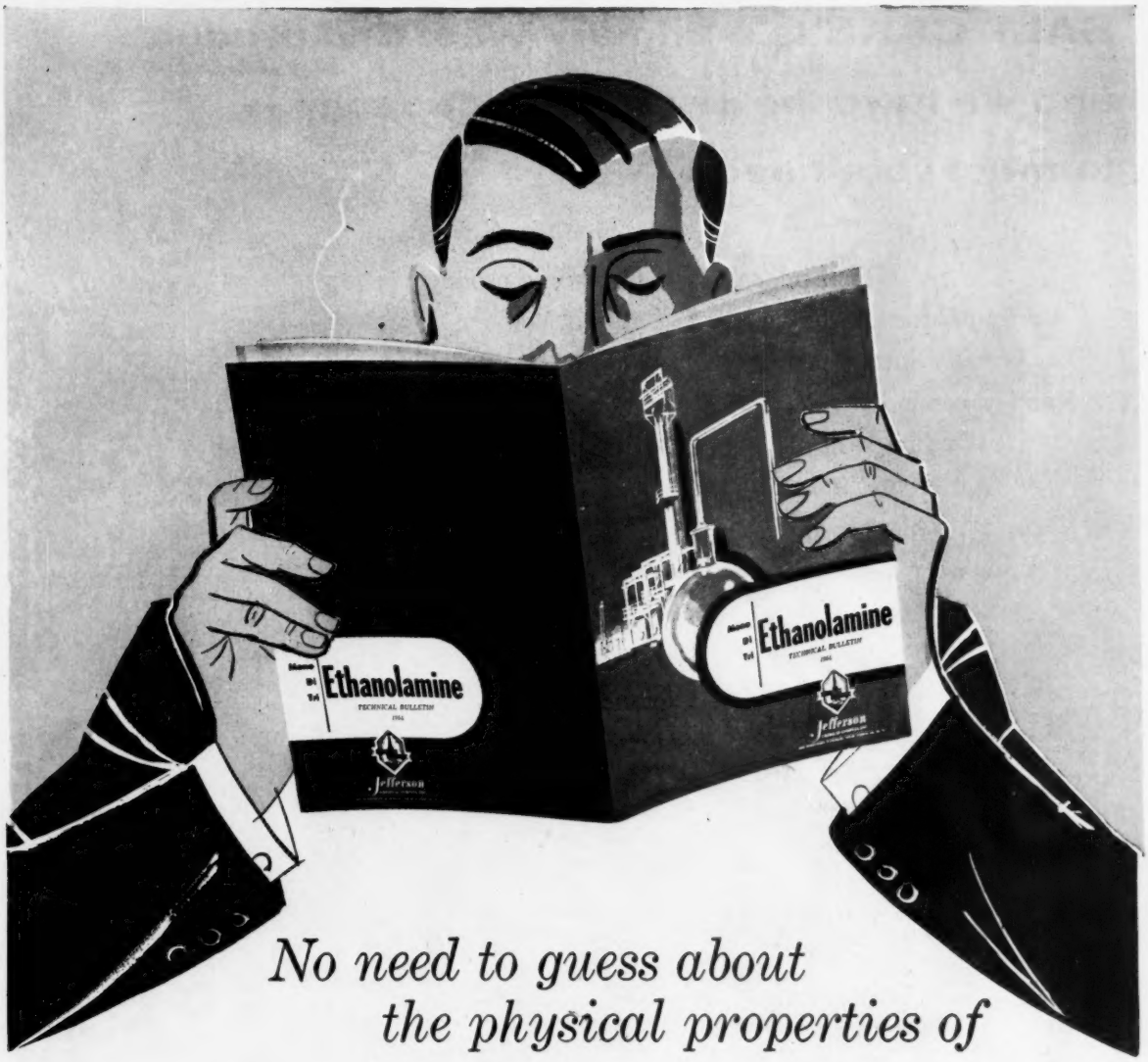
Whenever your difficulty is due to metal failure, send us the details. We'll give you suggestions on how to dispose of it. Write for List "A" of available publications. It contains a simple form that makes it easy for you to outline your problem. Send for it now.



Conveying abrasive phenolic powder calls for high resistance to wear. That's why stainless steel is used for this Archimedes conveyor, 50′ long and 14″ in diameter. Screw and housing tube, welded together, rotate as a unit. Design allows easier, faster cleaning, no matter what the color of resin handled. Fabricated by Stainless Products, Inc.

INCO TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N.Y.



No need to guess about the physical properties of

JEFFERSON **mono di tri | ethanolamine**

If you are interested in the physical properties of these versatile compounds, our technical bulletin will give you the information you seek. It describes graphically vapor pressure vs. temperature, boiling points of aqueous solutions, surface tension vs. temperature, specific gravity vs. temperature, specific heat vs. composition, freezing point vs. composition, and other properties.

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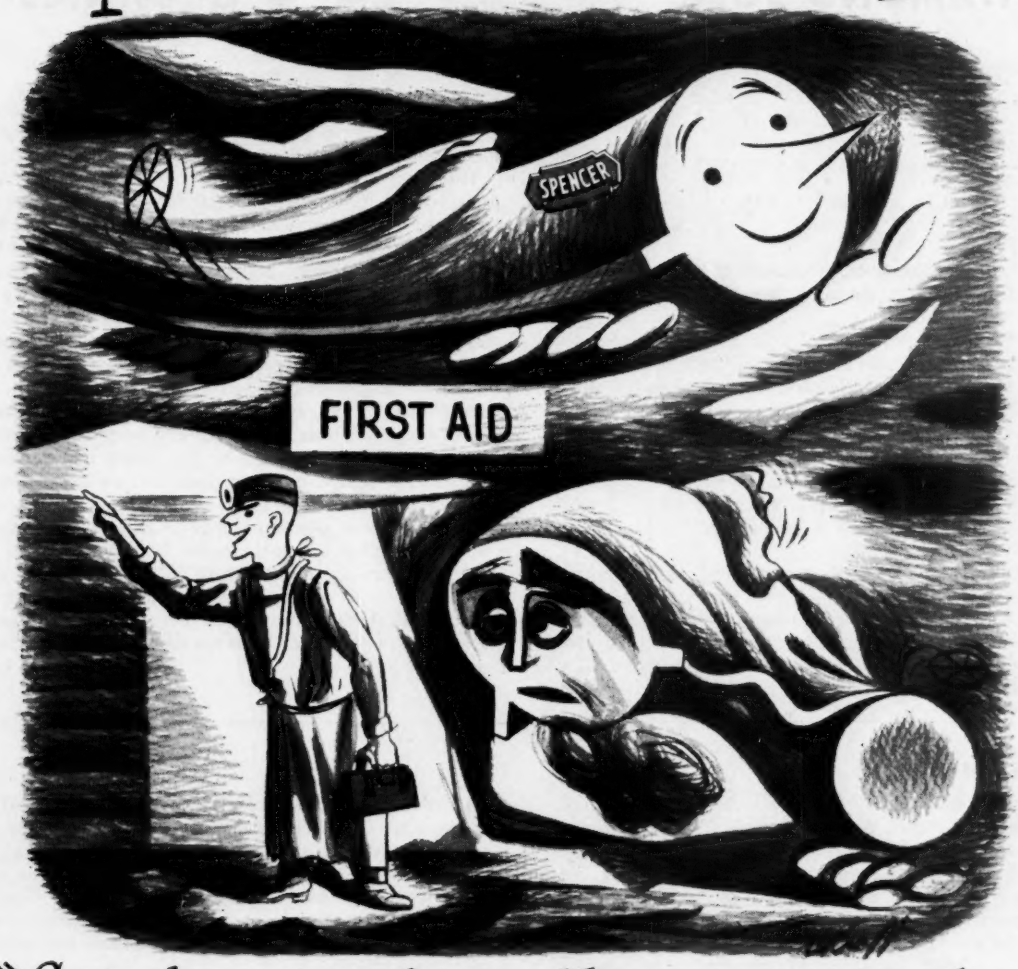
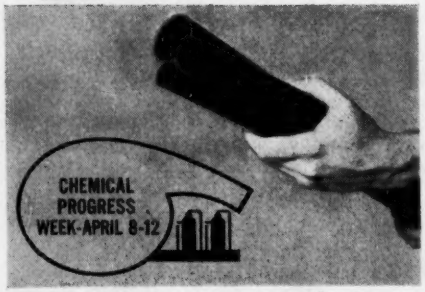


"Get the stretcher ... Here comes another one that tried to keep up with Tanky!"

MAKES BETTER PIPE!



Spencer's most recent contribution to chemical progress is new "Poly-Eth" 3405, proved by independent tests to be superior to any other commercially available polyethylene pipe resin.

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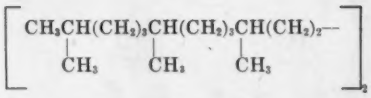
That ol' shark oil



This looks like a tedious concatenation of 30 carbon atoms and 62 hydrogen atoms, but oh, how wrong you would be to say that!

This is *Squalane*. (Note the "a".) We hereby announce our readiness to sell it as Eastman 7311 at $15.60 per 100 grams. *Squalane* is hydrogenated *Squalene* (Eastman P6966, note the "e"). We can distill squalene in our unique molecular stills from the oil found in the gigantic, oily liver of the mighty but leisure-loving basking shark. *Squalene* is being added to at least one brand of cattle feed on the strength of certain findings by the manufacturer about cholesterol and sex hormones. The merest *soupçon* of it in dog food is said to bring utter bliss to the canine palate.

(We once read a book about how a man went broke fishing for basking sharks. We also know a man who sells us oil from another kind of shark that has a liver even richer in squalene than basking shark liver. We doubt, though, that is why the first fellow went broke. Squalene is to be found in sweat. This is a statement about human sebum, not an aphorism. Squalene is also found in olive oil but not in other cheaper vegetable oils. Some fakers found out about that once. But we digress.)

The latest is that *Squalane* has a contribution to make to gas chromatography, which is booming. This is an analytical technique whereby a volatile sample mixture is swept by an inert gas through an adsorbing column and resolved by virtue of the different times it takes each component to make its way through against the adsorption forces. *Squalane* is reported (*Anal. Chem. 28*,303, March '56) to modify the adsorbing characteristics of a commercial carbon black in a manner that shuffles the order of emergence from what it is with other adsorbents, thus providing a good fix on the proportions of each different C_5, C_6, and C_7 saturated hydrocarbon present. One of our own plants tried it out and forthwith contributed further to the burgeoning art by discovering that *Squalane* is very good at separating hydrocarbons from oxygen-bearing compounds close to them in physical properties. They found, for example, that n-heptane emerges later than n-butanol, even though n-butanol is the higher boiling substance.

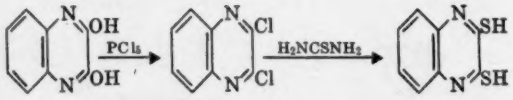
Will we reveal more about this? Will a certain series of experiments now in progress with *Squalane* at a certain well known medical school turn out to be as interesting as the preliminary results promise? Wait for the next gripping chapter, if any.

A nickel test

In ammoniacal solution, *2,3-Quinoxalinedithiol* forms a dark red complex with nickel. We have decided for this reason to make and sell it as Eastman 7317. Soon, doubtless, somebody will publish a procedure employing this as a more sensitive and/or more convenient and/or more foolproof reagent for nickel. More than what? It is better not to ask. Today man gives vent to the fires that burn within him by inventing a more ( ) test for nickel. (There are few galleons to plunder, no hairy mammoths to hunt down.)

We made this compound from *2,3-Dihydroxyquinoxaline* (Eastman 6232), which is useful in precipitating barium, calcium, and strontium from solution and then distinguishing between them. (We can furnish an abstract on that.) The *2,3-Dihydroxyquinoxaline* we make by condensing o-phenylenediamine with oxalic acid, not from quinoxaline itself. To make *Quinoxaline* (Eastman 7094), we use glyoxal, which is the simplest possible dialdehyde instead of oxalic acid, the simplest dibasic acid. (In truth, we don't directly use that green gas glyoxal, the simplest colored organic substance, but handle it as sodium glyoxal bisulfite.) *Quinoxaline* is an intermediate for antispasmodic compounds.

To replace the oxygens of *2,3-Dihydroxyquinoxaline* with the sulfurs of *2,3-Quinoxalinedithiol*, we choose for yield and quality this route:



The intermediate *2,3-Dichloroquinoxaline* we can offer as Eastman 7300. Maybe it's good for starting a fire of creativity.

Neither *Squalene*, *Squalane*, nor *2,3-Quinoxalinedithiol* is going to pay for the cost of this ad. What we want are thousands of chemists each using a copy of *Eastman Organic Chemicals, List No. 40*, to order a few grams of one of some 3500 other organics we stock. *That's* what makes the wheels go 'round. Do you have your copy? *Distillation Products Industries*, Eastman Organic Chemicals Department, Rochester 3, N. Y.

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"Another product safely shipped in Inland 'protection-eered' containers"*

A SOFT TOUCH FOR FINE FABRICS

A great many people had a hand in this fine fabric "creation"—including the folks at *Wallerstein Co., Inc.*, New York. Wallerstein is the producer of Rapidase, an enzyme preparation that "desizes" fabric after it is woven. Once the sizing is removed and the fabric has been given a "soft touch" by Rapidase . . . it is ready to be dyed, bleached or finished.

To maintain product quality and stability, Rapidase is shipped in Inland "protection-eered" containers. Inland specialists use a lining which prevents loss of enzyme activity during transit and storage. Result: Wallerstein's quality control of Rapidase is carried all the way to their customers.

Inland "protection-eered" containers have solved tough packaging problems for some of the country's leading companies. Perhaps they can solve yours. Write Bob Boecher, Dept. 332A.

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OPINION

Verona in N. J.

TO THE EDITOR: . . . You have indicated (*Feb. 16, p. 25*) that Verona Dyestuffs in Rock Hill, S. C., has acquired all the outstanding stock of the Pharma Chemical Corp. This, of course, is not correct, as Rock Hill, S. C., is only a branch of Verona Dyestuffs, with headquarters in Union, N. J. . . .

W. L. SWENSON
Vice-President
Verona Dyestuffs
Union, N. J.

Duly noted. Verona's hometown is Union, N. J.—ED.

Apologia Pro Pennsylvania

TO THE EDITOR: In the Dec. 8, '56 issue of *CW*, appeared a letter by William Alkus, Philadelphia, Pa., on the shortage of scientists and engineers. One of his statements interested me very much: "The writer has been personally waging a battle with the various boards of education about the need for experienced scientists to teach in secondary schools."

Mr. Alkus is to be congratulated for his one-man war. Any secondary school would consider itself very fortunate indeed to have a qualified science teacher who has had experience in industry. As a matter of fact, colleges and universities also are painstakingly seeking qualified experienced scientists as faculty.

Mr. Alkus continued, "Teachers in our public school system do not study subjects; they study teaching methods." He is apparently unfamiliar with the Commonwealth of Pennsylvania requirements for certification for teaching, as this statement is a strong indictment against "our schools."

Specific requirements have been established by the State Dept. of Public Instruction. The applicant for certification must be a graduate of an approved college or university and must have completed successfully at least 18 semester hours of work of college grade in education courses. Please note that only 18 semester hours in education are required to teach in "our schools."

However, the minimum requirements at the University of Pittsburgh for a chemistry major to qualify for teacher certification are as follows: The graduate must have not less than 28 semester hours in the four divisions of chemistry (inorganic chemistry, 9 semester hours; qualitative and quantitative analysis, 8 semester hours; organic chemistry, 8 semester hours; and physical chemistry, 4 semester hours). Quantitative analysis and physical chemistry require mathematics, hence the chemistry major is encouraged to minor in mathematics and physics. A mathematics minor requires 18 semester hours of trigonometry, college algebra, analytical geometry, and calculus. A physics minor requires 8 semester hours in general physics, and 10 additional semester hours in approved courses in physics.

A graduate with the above qualifications seldom applies for a teaching position because *industry* makes him a better offer. Would any chemical company tell a graduate to go teach in "our secondary schools" for a few years first?

Mr. Alkus made another interesting statement: "Science is taught by people, who, says the assistant superintendent of schools in Philadelphia, 'take refresher courses in science in order to be able to teach these subjects.' " Apparently he is unaware of what is going on educationally in his home town.

A letter to Dr. Allen H. Wetter, Superintendent of Schools, School District of Philadelphia, on December 14, 1956, brought this reply: "I have delayed my reply because I wanted to learn who on my staff had made such a statement. To date I have been unable to find that person, and I am completely at a loss to account for what appears to be a misinterpretation of facts."

Dr. Wetter continues: "Concerning refresher courses for teachers, I can think of only two cases in the field of science instruction where this might apply. In the summer, under the direction of our curriculum department, some of our teachers accept the opportunity offered by the great industries of Philadelphia to spend time in their laboratories learning about some of the latest research and development techniques. In the other case, because some of our schools are participating in the Ford Foundation for Advanced Standing, some of the teachers have indicated a desire to meet with college professors for the purpose of taking additional work that will help them to prepare advanced students for entering the sophomore year of college immediately following graduation from high school. If these are what Mr. Alkus means by refresher courses, I can assure you I have no apologies to make for the Philadelphia school system."

ANDREW A. SHEROCKMAN,
Pittsburgh, Pa.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St., New York 36, N.Y.

MEETINGS

American Chemical Society, 131st national meeting, Miami, April 7-12.

American Management Assn., 26th annual packaging conference, Palmer House, Chicago, April 8-10.

American Institute of Mining, Metallurgical and Petroleum Engineers, conference, Penn-Sheraton Hotel, Pittsburgh, April 8-10.

Chemical Progress Week, April 8-12.

Bituminous Coal Research, Inc., annual meeting, the Greenbrier, White Sulphur Springs, W. Va., April 18-19.

American Industrial Hygiene Assn., conference, Kiel Auditorium, St. Louis, April 22-26.

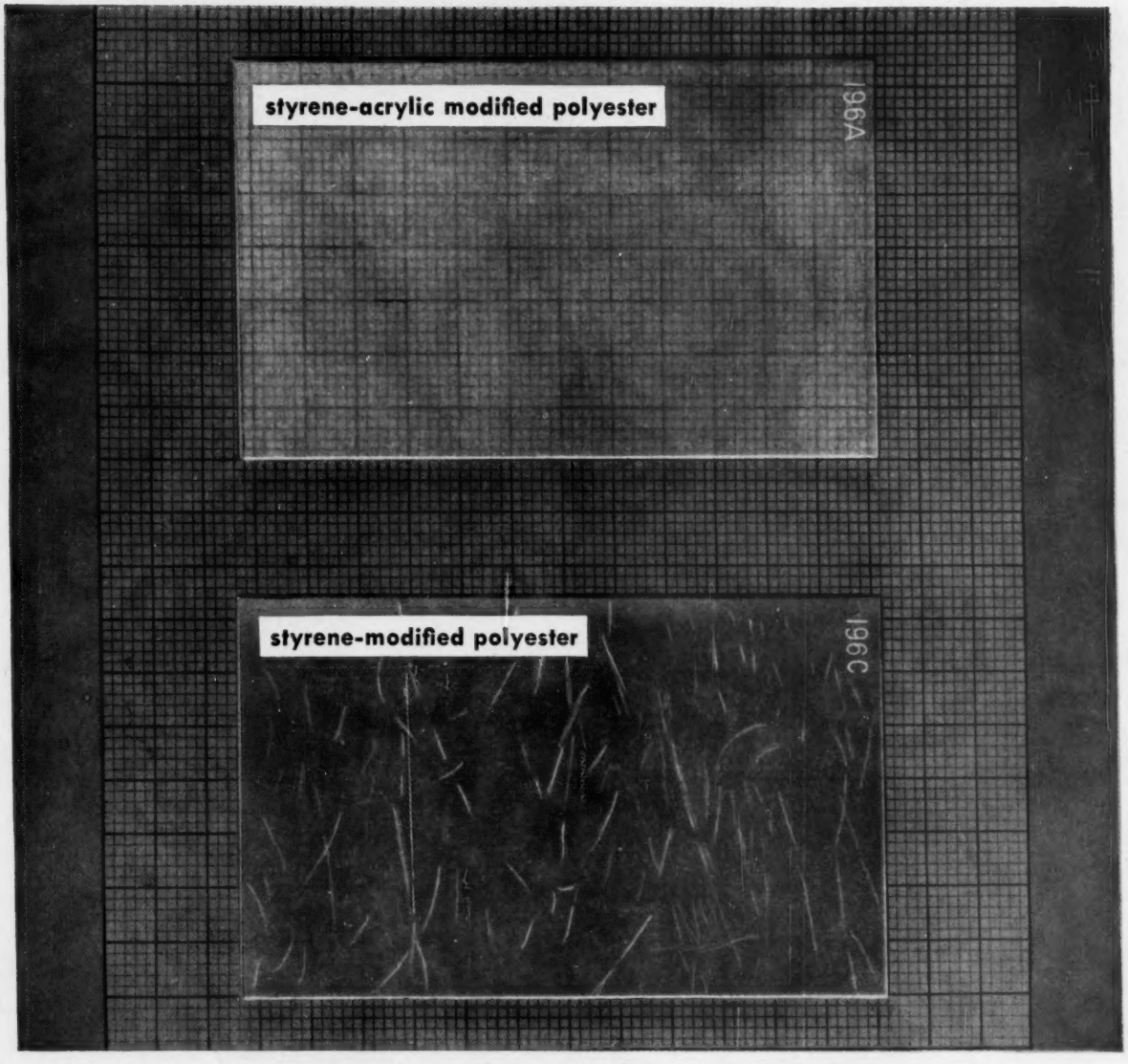
Assn. of Consulting Chemists and Chemical Engineers; symposium: International Science, a Catalyst for World Security, Belmont Plaza Hotel, New York, April 24.

American Zinc Institute, 39th annual meeting, Drake Hotel, Chicago, April 25-26.

Scientific Apparatus Makers Assn., 39th annual meeting, the Greenbrier, White Sulphur Springs, W. Va., April 27- May 2.

American Oil Chemists' Society, 48th annual meeting, Roosevelt Hotel, New Orleans, April 29-May 1.

American Materials Handling Society, materials handling conference, Convention Hall, Philadelphia, April 29-May 3.



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Looking at these glass fibre reinforced panels, you'd hardly suspect that both were exposed to the same Florida weather for 12 months. The one, made with a styrene-modified polyester resin, suffered surface erosion, discoloration, and fibre "splintering." But the other, made with a styrene-acrylic modified polyester resin, retained its color and surface gloss without fibre evidence. This is typical of the built-in benefits you get through copolymerization of Rohm & Haas acrylic monomers with many other monomers. The primary chemical bonds which are formed mean that the acrylates cannot migrate, volatilize, or be extracted by even the strongest solvents. As a result, copolymers remain tough and flexible longer . . . resist attack by heat and ultraviolet light. To see how acrylic monomers can improve your product, write for our detailed booklet.

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Ethyl acrylate	Hexyl methacrylate
Butyl acrylate	Decyl-octyl methacrylate
2-Ethylhexyl acrylate	Lauryl methacrylate
Methyl methacrylate	Stearyl methacrylate
Ethyl methacrylate	Glacial acrylic acid

Glacial methacrylic acid

Chemicals for Industry

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Business
Newsletter

CHEMICAL WEEK
April 6, 1957

Taking advantage of new tax help to oxygen producers, Air Reduction will build a $9-million air-separation plant at Acton, Mass. (near Boston). As the Office of Defense Mobilization and the Business & Defense Services Administration require (*see p. 24*), the new plant will make 99.5%-pure liquid oxygen and nitrogen, also argon. In all, Airco will seek fast write-offs on about $20 million worth of its over-all oxygen plant expansion, some of which is already under way. Air Reduction Sales Co. will build the new unit, expected to be in operation by the end of '57.

Meanwhile, Linde claims 80% restoration of its over-all output of oxygen, nitrogen, argon—four of the company's oxygen plants are beset by strikes. By operating its Essington and Kittanning, Pa., plants (two of the struck plants) with supervisory personnel, it is able to make tank-car shipments.

In its signing last week of a contract with Oil, Chemical & Atomic Workers Union at Milwaukee, Linde management sees a break in labor's united front at the oxygen plants. The new Milwaukee contract provides an average raise of 9½¢/hour.

Linde reportedly was to expand production by 50% this year at its Ashtabula, O., plant, at a cost of $12 million. Similar expansions were slated for East Chicago and Kittanning units.

•

Only one of B. F. Goodrich's seven chemical plants was hit by the strike that tied up the firm's rubber plants this week. The strike, by United Rubber Workers of America, inactivated the Akron Works, a small unit of Goodrich's chemical interests, only because the Akron plant is still under the jurisdiction of URWA—Distillery, Rectifying and Wine Workers International has control in all of the company's other chemical plants.

•

Abbott's entry into manufacture of gibberellic acid underlines the surging interest in the growth-stimulating garden chemical. As predicted (*CW, Feb. 9, p. 65*) Fertl, Inc.'s 3F spray and Merck's Gibrel were but the first of a host of products:

Domestic makers of the raw material are now Abbott, Merck, Pfizer; Imperial Chemical Industries also sells it in the U.S.

Formulators now include W. A. Cleary Co. (New Brunswick, N.J.), Doggett & Pfeil (Springfield, N.J.), Miller Products Co. (Portland, Ore.), Nott Mfg. Co. (Mt. Vernon, N.Y.), Plantabbs Corp. (Baltimore),

Plant Products, Inc. (Blue Point, N.Y.), Rainbow Color and Chemical Co. (North Ridge, Calif.), Rose Mfg. Co. (Yakima, Wash.), and recently, S. B. Penick (New York).

•

Columbian Carbon and Celanese together will make carbon black in Brazil. Joining with Traders, Inc., to form Companhia Petroquimica Brasileria (Copebras), they will erect a 30-million lbs./year unit near Sao Paulo, hope to be in operation by early '58.

•

Some chemical specialties are targets of the first crackdown by the Federal Trade Commission on television and radio commercials. FTC charged Mentholatum Co. Inc. (Buffalo), maker of Mentholatum Rub; Whitehall Pharmacal Co. (New York), maker of Infra-Rub and Heet; and Omega Chemical Co., Inc. (Jersey City, N.J.), maker of Omega Oil, with "falsely advertising" their products.

On network TV (Omega uses radio), FTC charges, mentholatum and Whitehall promote their products as effective and reliable treatment for the aches and pains of arthritis, rheumatism and related diseases. But, says FTC, "none of them will have any beneficial effect in excess of affording temporary relief of minor aches and pains of these ills."

The agency set up a special unit last October to monitor radio and TV; the advertisements FTC found objectionable, however, also appeared in magazines and newspapers. The firms have 30 days in which to file answers to the charges.

Government-held stock of another firm with chemical interests in Germany will soon be on the market. The U.S. government has filed a registration certificate with the Securities & Exchange Commission for its 530,512 shares of Hugo Stinnes Corp., a New York City holding company. The $5-par common, about 53% of the total, has been U.S.-held since World War II.

No date has been set for receiving bids; some additional terms of sale must be worked out, officials say. Currently, the firm is managed by the government.

•

Fast tax write-off certificates seem near for glycerine plants of Olin Mathieson and Union Carbide, but the hopes of Dow and Shell are dwindling (*CW Business Newsletter, March 16*). A Justice Dept. opinion this week suggests the feeling on the part of the department that competition would not be promoted by granting Dow and Shell the certificates (both firms already have synthetic glycerine plants in operation). The opinion has been handed to the Business & Defense Services Administration, which in turn will make its recommendation to the Office of Defense Mobilization. ODM issues the certificates, is expected to act quickly.

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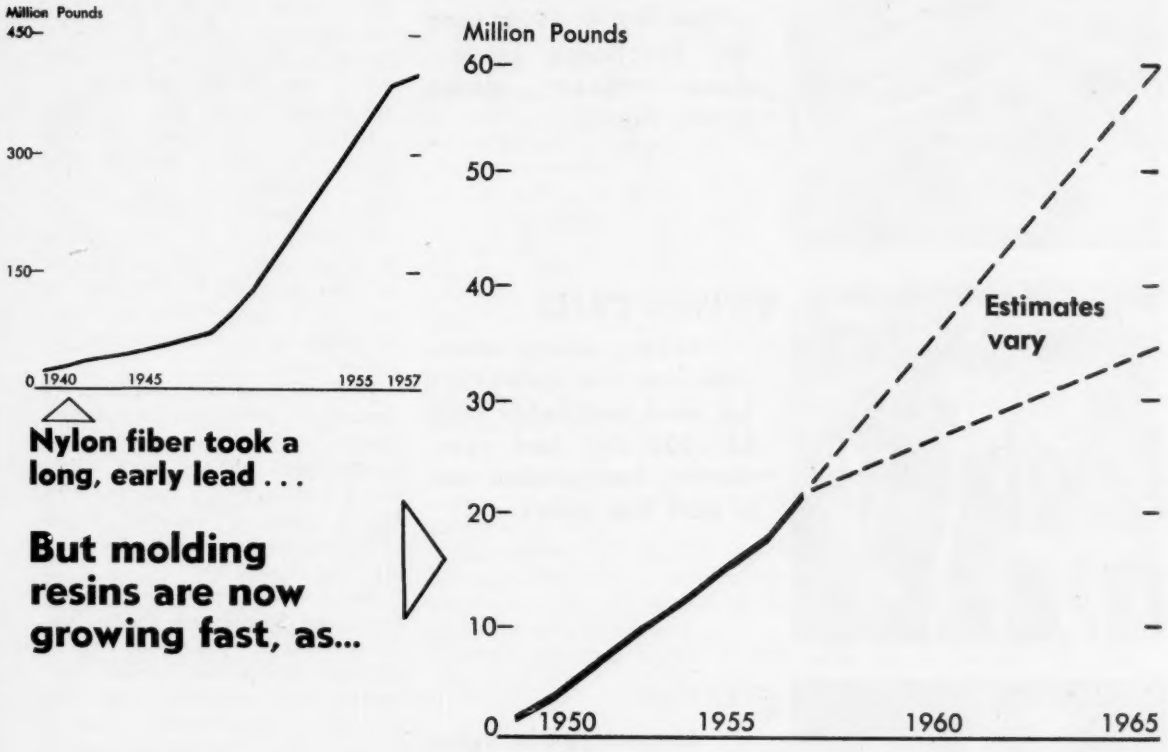


Nylon Gets Its Second Wind

Of all the materials that were talked about in the corridor during last week's Commercial Chemical Development Assn. plastics meeting (*see p. 113*) in New York, the most-mentioned was nylon. And for good reasons:

- Consumption of nylon powders has increased ninefold since 1950. By the end of 1957, consumption will be about 22 million lbs./year—a tenfold gain over 1950.
- The approaching entrance of two new producers of polycaprolactam (nylon 6)—Spencer Chemical and Foster-Grant—heralds a new surge of nylon interest that could double (some say triple) the 1957 total by 1965.
- Increasing domestic availability of caprolactam, monomer for nylon 6, opens nylon manufacture to companies heretofore kept out by the Du Pont grip on the process and materials for nylon 6/6.
- Development of new nylon-resin variations and end-uses points to broad new applications for the product.

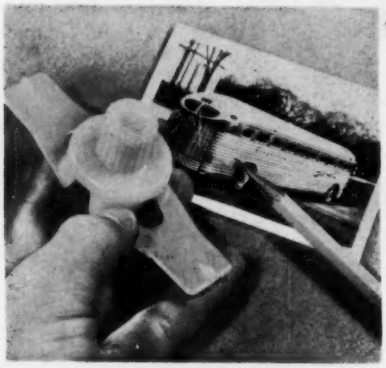
Slow Start: Although nylon plastic was actually introduced before the fiber, its price at the time (1939)—perhaps five times that of other commercial plastics—served to relegate it to a secondary position. Furthermore, the fiber form's fabulous success—1957 capacity will stretch toward 400 million lbs.—pretty well obscured the molding plastic.

It took a combination of factors to make nylon plastic come of age: the Korean War, with its sudden demand for a tough wire coating; molders' need for a premium material for high-stress uses; molders' increasing familiarity with handling techniques.

At first, fabricators were limited to Du Pont's nylon 6/6 products made from adipic acid and hexamethylene diamine (HMDA); and the 6/10, made from HMDA and sebacic acid. Key to the names: in the case of the 6/6, the sixth carbon atom of HMDA links with the sixth carbon atom of adipic acid; in the 6/10, the number six carbon in HMDA hooks onto the tenth carbon of the sebacic acid. Type 6/6 was the predominant item—it was also Du Pont's standard type for fiber.

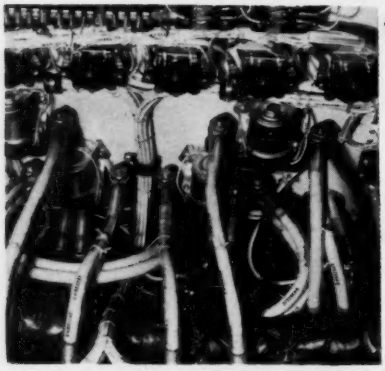
Available by import was nylon 6 (polycaprolactam, or perlon). The differences in 6 and 6/6 are not great—generally, 6 is deemed softer, easier to mold, and more flexible, but it lacks 6/6's heat and abrasion resist-

Molding: In 1956, 18 Million lbs. for....



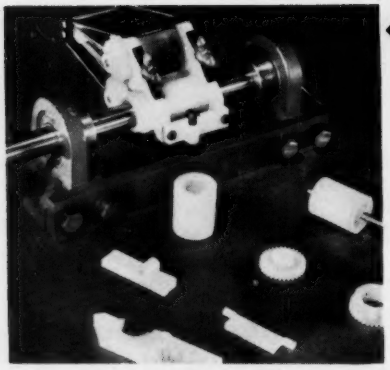
AUTOMOTIVE

Elevenfold growth since 1950. About 4.5 million lbs. in 1956; used for functional parts—door strikers, dome lights, tubing.



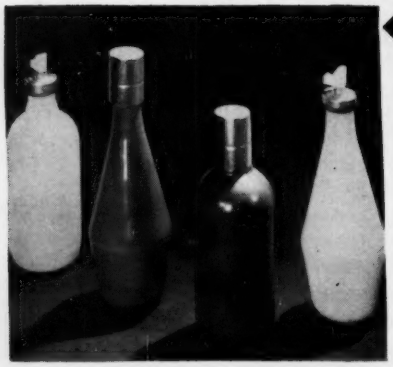
WIRE & CABLE

Heavy-duty abrasion-resistant covering for wire and cable took 824,000 lbs. last year. Market has leveled out in past few years.



TEXTILE

Biggest rise in nylon demand is for textile equipment — 1956's 2.4 million lbs. was 26 times '50's needs. Other machinery uses such as gears and bearings took 7.5 million lbs.



OTHER

Aerosol valves topped packaging uses, helped put 'other' uses at 2.5 million lbs. Medical uses took 1.7 million lbs. in '56. Monofilament adds about 4 million lbs. /year to total figure.

ance and short-mold cycle. Now, however, the two types are interchangeable in 70% of applications, and this percentage is growing.

Who's Coming: As the only domestic nylon maker, Du Pont, with its 6/6, for years dominated the nylon plastic scene. But Allied Chemical's caprolactam and nylon 6 molding powder is bringing two more nylon makers into the field and paves the way for more in the next few years.

First of two companies to come along with polymer facilities using Allied monomer (*see table, p. 23*) will be Spencer Chemical, which until startup (July '57) will continue to sell as Spencer Nylon the polymer (Akulon) imported from Holland. By early 1958 Foster-Grant will begin by selling one molding and one extrusion resin.

Low-Toll Road to Nylon: Since it's cheaper to polymerize caprolactam than to polymerize the more expensive hexamethylene diamine with adipic acid for nylon 6/6, a company with limited financial resources would seriously consider that path. But there are other reasons, too.

One is that companies like Foster-Grant and Spencer are dividing the material-making task with Allied. (It's not inconceivable, however, that Spencer may eventually step into caprolactam manufacture.) Another reason is that material for making nylon 6/6 powders just has not been available in finished form.

Du Pont has never sold starting material for making nylon 6/6.

Markets: Until recently, nylon plastic has gone mostly into the molding (distinguished from extrusion) field. Last year, some 17.6 million lbs. went into molded articles (*cuts left*). But lately, new strides have been made in extrusion, particularly as viscosity problems have been overcome. Moreover, say all makers, extrusion shows tremendous promise. Says Spencer Chemical, "The fact that we'll offer five forms of extrusion powder, and only three forms of molding powder, indicates our belief in the future of extrusion."

Replacement of metal has created broad openings. Outstanding example is the dramatic growth of nylon in the textile-machinery field. Between 1950 and 1956, nylon consumption for textile machinery has jumped from 90,000 lbs. to 2.4 million—a growth

of over 2,500%. Du Pont and Allied look to the broad area of industrial machinery as potentially the largest market for the material.

But nobody's slighting the others. At present, it's felt, no one market category can safely be called the biggest potential outlet for nylon. Uses in the automotive field (and the wire and cable market) have jumped dramatically, too. And there's an encouraging new market opening in packaging—e. g., aerosol containers, and transparent wrapping film. There's also the strong expectation that the medical and surgical equipment field will absorb much more.

As one market researcher sums it up, "Nylon's future seems to be assured in any field where it can more economically do the job. All we've got to do is convince people." Two products to look for within a year are high-molecular-weight (denser) nylon 6, and several types of transparent nylon—one a nylon 6, the other of undisclosed composition.

Prices: Market possibilities will pick up as prices go down. Already, the caprolactams have exerted pressure on nylon prices in general. In 1942, Du Pont's Zytel-101 (uncolored) was commanding a price of $2.10/lb. In 1944, it dropped to $1.60/lb. and continued there until 1955, just a short time after Allied announced its nylon 6 venture. Shortly thereafter, price moved downward to $1.43/lb.; today it is $1.33.

And the end isn't in sight. Most people watching nylon feel there's still plenty of room for price drops. First of all, they expect that the cost of caprolactam, now about 65¢/lb., can go much lower, possibly down into the low 40's; second, that polymerizing processes are so new that the tag on polymer can go to under $1.00/lb. And, if caprolactam prices drop, the 6/6 prices will be forced down, too. One thing seems pretty sure, however: new price cuts won't come before 1958.

One decrease in cost of caprolactam might come from a new starting material. Allied first hoped to start with cyclohexane, but it later turned to more expensive phenol. All manufacturers of caprolactam, however, are actively seeking something besides phenol as the starter.

Expectations: All those connected with nylon plastic development foresee great things for the materials in the next few years. Allied, for example, is reportedly operating its resin plant at capacity, expects in 1957 to double its 1956 sales. The plant, adjacent to the Caprolan fiber works, is readily expandable; overflow operations would go into the latter plant, where start up problems have kept output of the textile material to a low level.

Du Pont, though quiet about sales projections for 1957, says that its resin shipments have quadrupled in the past five years and have tripled in the past three.

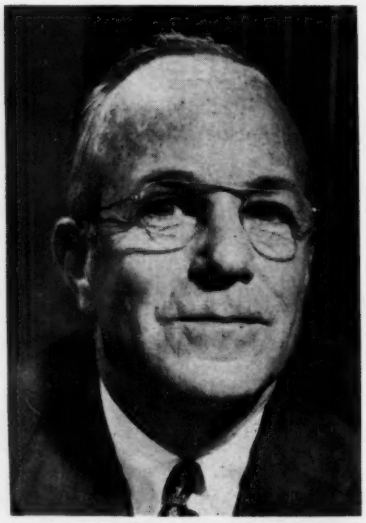
(The company also claims that from 1948-53, the first five years of the firm's expanded activity, it sold more than 40 million lbs. of molding resin.)

Spencer and Foster-Grant, too, see a bright future. Both consider the potential large, and all four companies expect metal replacement to provide the foundation upon which their nylon growth will be built.

Tough Race: But there'll be plenty of competition for everybody. Other plastic makers aren't going to pass up the challenge, and new plastics such as GE's polycarbonates (*see p. 96*) will be tough to beat. And it's conceivable that high-cost foreign nylons such as Rilsan (nylon 11), BCI nylon (nylon 8) and some of the European 6's will come down sufficiently to compete here, further liven the race.

U. S. Nylon Plastic Interests

Maker	Plant Location and Capacity (est. lbs./year)	Types	Tradename	No. Forms and End-Uses
Du Pont	Parkersburg, W. Va.—20 million; expected to be 25 million, end of '57	6, 6/6, 6/10	Zytel	5 injection, extrusion 2 molding, extrusion 2 inj., extr., solution 2 extrusion
Allied	Chesterfield, Va.—7-9 million; expected to be 10 million, end of '57	6	Plaskon	1 molding 1 extrusion
Spencer	Henderson, Ky.—2-4 million (due mid-'57)	6	Spencer Nylon	3 molding 5 extrusion
Foster-Grant	Leominster, Mass.—2-3 million (due early '58)	6	Fosta Nylon (second name under study)	1 molding 1 extrusion



WEST VIRGINIA'S LUKE: He sees a surplus in pulp-paper production.

Paper Cutback

Talk of overproduction in pulp and paper is taken seriously by at least one large paper firm—West Virginia Pulp & Paper Co. That company is making one of the industry's first major cutbacks because of projected overcapacity, will delay construction of two large paper machines costing nearly $50 million. Reason, says President David Luke: "the probable surplus capacity in the paper industry."

Luke told stockholders at the firm's annual meeting last week that West Virginia has been feeling a cost-price squeeze and a definite letup in demand for its products over the past few months—and that papermakers, in general, could be facing some drastic price-cutting and loss of profits from overproduction in the next five years. Thus, says Luke, installation of two paper machines at the firm's Maryland mill in 1958 and '59—the company's primary expansion project planned for those years—will be delayed at least until '60. Luke added, however, that expansion planned for '57 and early '58 are already "well advanced" and will probably go through on time.

In place of the Maryland expansion, Luke said, the company will concentrate on a plant improvement program and increased sales effort. He emphasized that the company doesn't intend to cut its capital spending appreciably until possibly '58 or '59.

Rocket Fuel Criteria

Fast tax write-offs for new liquid oxygen and nitrogen transportation equipment are among advantages offered last week to liquefied gas producers who participate in the expanded defense production program for the rocket fuel raw materials. The Office of Defense Mobilization and the Business & Defense Services Administration announced their criteria just a month after proposing the new program (*CW, March 16, p. 23*).

To qualify for write-offs under the ODM-BDSA plan:

- Companies must produce liquid oxygen and nitrogen of at least 99.5% purity.
- New or expanded plants will be eligible only if they produce four parts liquid oxygen each part liquid nitrogen. Otherwise, only the increase in liquid nitrogen output will be eligible.
- Companies must deliver the gases to military customers—they'll able to write off any needed equipment, such as tank cars and trucks.

Okays for Florida Line

Houston Texas Gas & Oil Corp. and Coastal Transmission Corp. have cleared all major hurdles before they start construction on the mammoth Texas-to-Florida natural gas pipeline.

The Federal Power Commission last week accepted rate schedules filed by the two companies and granted them a certificate to build the line. The firms still have to submit financing plans acceptable to FPC as well as amended service agreements (contracts with purchasers). But company officials don't believe these will pose any particular difficulties.

The two firms stated that they plan to start construction of the 2,600-mile system sometime this year and hope to complete it in 12 months. Now that the certificate has been granted, construction could get underway at any time—but actual gas service can't begin until all of FPC's conditions are met.

When the $150-million project is completed, probably by mid-'58, it will deliver 240 million cu./ft. day of natural gas to some 47 Florida communities and industrial consumers—among them, some of Florida's chemical plants.

1955 U.S. Chemical Sales in Middle East

(million dollars)

	Israel	Arab*
General chemicals	$5.1	$13.3
Medical and pharmaceutical	1.2	9.4
Specialties	1.8	5.4
Pigments, paints and varnishes	0.4	1.5
Insecticides and fungicides	0.3	1.1
Total	**$8.8**	**$31.7**

*Figures from Lebanon, Iraq, Syria, Egypt and Saudi Arabia. Boycott nations for which figures are unavailable: Jordan, Libya, Sudan.

Caught in Arab Boycott

Several U. S. chemical companies are getting their fingers caught in the economic noose the Arab nations are tightening around Israel. Latest addition to the list of firms officially boycotted by the Arabs for dealing with Israel is International Latex Corp.

In the past year, the league has blacklisted 25 companies in 19 nations, pressured 49 others into discontinuing commercial relations with Israel. Among the U. S. chemical makers are General Tire & Rubber Co. [which has a minority interest in General Tire & Rubber Co. (Israel) Ltd.]; Plough Corp; Hudson Pulp & Paper Corp.; and Sinclair and Valentine Inc.

Wide Range: The pressures—and responses—have covered a wide range. One U. S. firm refused to undertake a market survey for Ashdad Chemical Industries of Israel in order not to "jeopardize their widespread interests in the Arab countries." Four firms refused to bid on the construction of an Israeli lubricating oil refinery because they had commitments in Arab countries. On the other hand, one firm refused to bow, but reports that it has lost sales in Arab nations.

Under the rules the Arab League has set up, Arab nations will not trade with firms that have branches or investments in Israel, sell goods to Israel, buy from Israel, or are Jewish owned. Saudi Arabia has even gone so far as to circulate a questionnaire asking firms if they employ Jews.

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EXPANSION

Organics: B. F. Goodrich Chemical Co. will build a $5-million plant near Henry, Ill., to produce organic chemicals for the petroleum, rubber and plastic industries. Construction will get under way within the next 60 days, completion is scheduled for early '58. Contractor is Blaw-Knox (Pittsburgh).

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Petrochemicals: Vickers Petroleum Co. (Wichita, Kan.) is planning a $2-million petrochemical plant near Potwin, Kan. Using a Udex extraction unit designed by Universal Oil Products Co., Vickers will make toluene, benzene, xylene and other 9-11 carbon-atom aromatics. Procon Inc. (Des Plaines, Ill.) is the contractor.

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Fertilizer: Farmers Fertilizer Co., a Midwest farm cooperative, will build a $13.5-million fertilizer plant several miles northeast of Georgetown, Ida. Construction of the new unit, scheduled to produce calcium metaphosphate by the electric furnace method, will get under way about June 1. The entire project is scheduled for completion by late '58. Farmers Fertilizer is jointly owned by 16 regional co-ops that serve approximately 2 million farmers.

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Solid Propellents: Thiokol Chemical Co., maker of solid rocket propellents, will add eight new buildings to its Lampo, Utah, complex. Included in the group are two processing plants costing about $250,000 each and an administration building. Olsen Construction Co. (Salt Lake City) will do the engineering.

COMPANIES

Spencer Kellogg & Sons (Buffalo, N.Y.) is asking stockholders' approval of a merger with Beacon Milling Co. (Cayuga, N.Y.). Directors of both firms have approved terms calling for Kellogg to exchange 1.3 shares of its capital stock for each outstanding share of Beacon. Two Beacon directors will serve on Kellogg's executive board.

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Emery Industries Inc. (Cincinnati) has formed a wholly owned Canadian subsidiary, Emery Industries (Canada) Ltd. The new company will take over the fatty acid manufacturing facilities owned by S. F. Lawrason & Co., Ltd. (London, Ont.).

•

Pennsylvania Salt Mfg. Co. shareholders will be asked at the firm's annual meeting on April 24 to approve an increase from 1.5 million to 2 million shares in authorized common stock. Too, they'll vote on whether the company may double its long-term debt limit to $50 million. The increase, Pennsalt says, would permit it to acquire other companies or otherwise take advantage of expansion opportunities.

Southern Gum Processing Co. (Savannah, Ga.) will sell its gum processing plants in Tifton and Fitzgerald, Ga., to Turpentine & Rosin Factors Inc. and the Langdale Co. Southern Gum will continue to operate processing units at Helena, Homerville, Hazelhurst.

•

Reynolds Metals Co. plans to raise $35 million by offering additional common shares to its stockholders. Present plans call for giving stockholders options to buy one new share for every 11 held. Proceeds, plus $115 million to be borrowed from banks and institutional investors, will be used to speed up the firm's expansion program.

•

National Petro-Chemicals Corp., jointly owned by National Distillers Products Corp. and Panhandle Eastern Pipeline Co., has borrowed $14 million from a group of insurance companies to repay long-term bank loans and advances from its parent companies. An additional $8 million, to be borrowed later this year, will be used for the same purpose.

FOREIGN

Eucalyptus Pulp/Brazil: W. R. Grace & Co. will join with the Cia. Paulista de Estradasde Ferro railroad in setting up a plant in Sao Paulo to produce cellulose and paper from eucalyptus pulp. Initial capital of the venture will be about $20 million. The Paulista railroad will contribute 5.5 million of its 23 million eucalyptus trees, as well as 10% of the financing. The other 90% will be supplied by Grace. This project should take a large part of the $20 million Grace has announced it will spend in Brazil.

•

Bauxite/Jamaica: Reynolds Metals Co. has obtained rights to mine bauxite in Jamaica for 99 years, tax-free for the first 25 years. For 25 years, Reynolds' wholly owned subsidiary, Reynolds Jamaica Mines, Ltd., will pay a royalty to the Jamaican government of about 42¢/long dry ton for the first 2 million tons shipped in a year, 29¢/ton on additional tonnage.

•

Ilmenite/Australia: Proposed expansion of Australia's ilmenite facilities should place that country in second or third place among world ilmenite producers. About 120,000 long tons/year of ilmenite concentrate are being mined now. Production should reach 250,000 long tons by mid-'58. Western Titanium N. L. is planning further expansion, and Westralian Oil Ltd. is considering building a plant for the production of concentrates. By late '57, Cable Ltd. will have raised its capacity to 90,000 long tons/year. Domestic requirements are about 25,000 tons/year. During '57, the bulk of the ilmenite will be shipped to Japan, but European and U.S. markets may take an increasing percentage.

It's slim . . . feminine . . . ideal for cosmetics!

It's Canco's 8-oz. "Queen Size" pressure container!

Any woman will appreciate this slim, graceful, easy-to-hold container. That's why it's perfect for cosmetics—hair sprays, lotions, creams and many others.

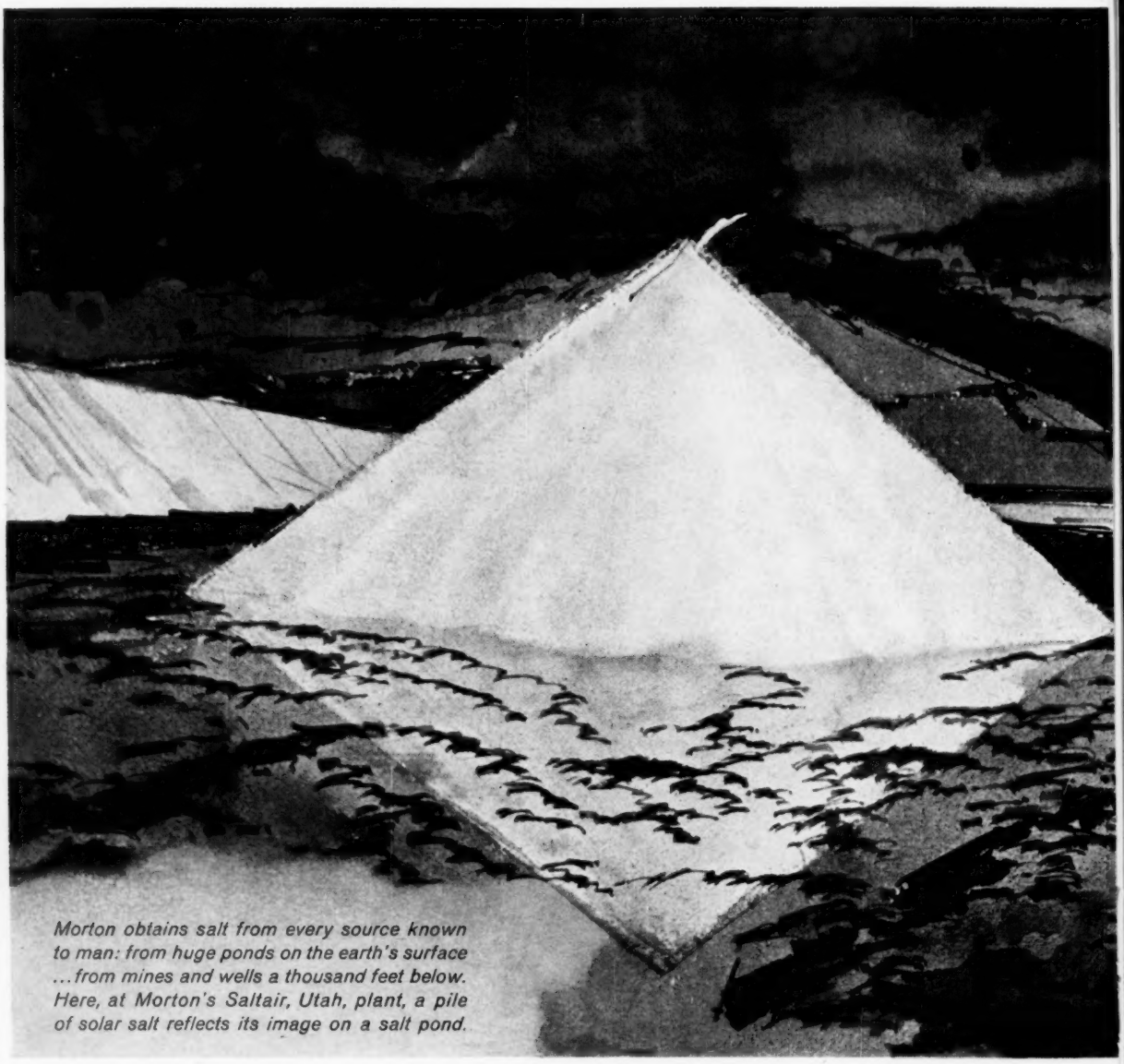
The "Queen Size" container is available with Canco's one-inch cup opening top, or an individually styled one-piece top. Either will accommodate a variety of valves and both are adaptable to all filling and closing equipment.

The Canco representative will gladly tell you more about this well-designed pressure container and others in Canco's line—the most complete line in the industry. Give him a call!

How Canco saves you up to 35% on your packaging costs

- Canco containers cost less initially, because they're mass-produced on standard can-making equipment.
- Canco offers all popular sizes: 3-oz., 4-oz., 6-oz., 8-oz., 12-oz., and 16-oz. Available with cup tops, *or with one-piece tops which simplify packing, cut costs.*
- Canco works directly with valve makers and contract loaders to give you the most efficient package at lowest cost.
- Canco's many plants assure you prompt service, uninterrupted production schedules.

COME TO CANCO FIRST! *American Can Company* *New York · Chicago · San Francisco*



Morton obtains salt from every source known to man: from huge ponds on the earth's surface ... from mines and wells a thousand feet below. Here, at Morton's Saltair, Utah, plant, a pile of solar salt reflects its image on a salt pond.

Because Morton has nation-wide salt sources . . . sales-service offices

Only Morton can offer you the right salt

Morton produces, refines and sells salt to industry for every use under the sun—for everything from seasoning food and setting dyes to making chemicals and curing hides.

As the only nation-wide salt company, Morton is able to supply industry with salt from *all* three sources: from mines, wells, and solar ponds. As a result, Morton can produce the right salt for *any* industrial use.

Salt is not all the same

You may not realize that there are three different types of salt and nearly 100 different grades—each with its own peculiarities of purity, shape, texture, and rate of solubility. But you should realize that the right salt for the right job will help you reduce costs, save time, and turn out products of uniform high quality. That's why it's wise to get advice from a salt specialist.

How Morton can help you

Morton has the most complete salt research laboratory in the world. Morton also makes every grade of salt. This means you get expert, impartial advice on which grade or grades will do the best job for you. If your Morton salesman personally can't solve a salt problem for you, he can refer the problem to Morton's research laboratory for quick, thorough analysis. This service help you get from Morton may be worth thousands of dollars to you every year.

in all key cities . . . and the world's finest salt research center . . .

for every industrial use, coast to coast

Only Morton is equipped to serve any kind of industry, anywhere in America

Regardless of your size, your needs, or your location, Morton has the facilities to serve you. Morton has 14 strategically located plants, including sources of supply in Canada and the Bahamas, plus sales-service offices from coast to coast. And only Morton can offer you fast delivery on a bag to a trainload of salt anywhere in the country.

MORTON SALT COMPANY

INDUSTRIAL DIVISION

120 So. La Salle Street, Chicago 3, Illinois
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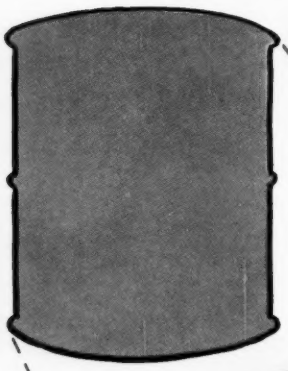
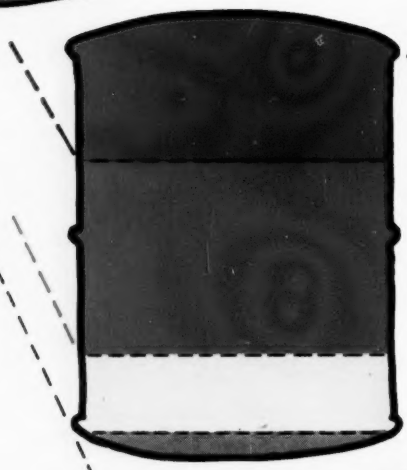
More Value With Each Step



XYLENE MIXTURE

Composition: ethylbenzene 10%; o-xylene 25%; *m*-xylene 45%; *p*-xylene 20%. About 704.4 million pounds were available from petroleum sources in 1955, the last year complete figures are available. Value—in applications that can utilize a mixture . . .

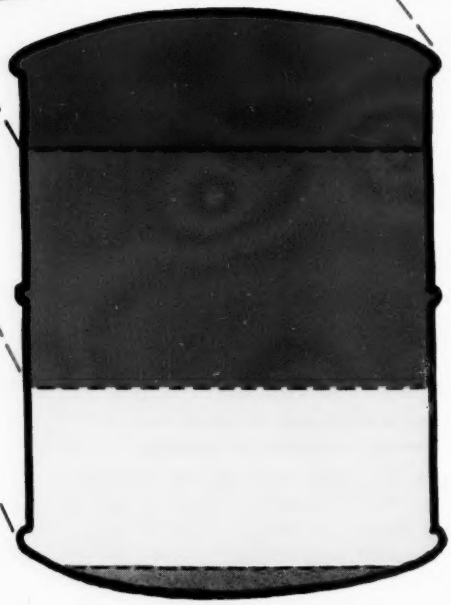
$31.7 million



SEPARATION

. . . permits each component to be assigned a value it would command if charged to a chemical process: o-xylene, 5¢/lb.; *m*-xylene, 13¢/lb.; *p*-xylene, 19¢/lb. A credit of 3¢/lb. is assumed for ethylbenzene. Multiplying by the number of pounds in each case—70.4, 176.1, 317.0, 140.9 million—gives the total value of each. Combined total . .

$78.9 million



OXIDATION

. . . of the o-, *m*-, *p*- isomers to phthalic anhydride, phthalic acids further increases value. Figuring phthalic anhydride at 21¢/lb., isophthalic acid at 24¢ and terephthalic at 35¢, total value . . .

$196.7 million

—Incentive for Xylene Development

ONE BIG REASON why the xylenes are about to assume brand-new importance as a chemical raw material is summed up by the figures on the opposite page. Their message is this: Available in tremendous quantities, the xylene mixture goes for a modest selling price, mostly as a solvent or as an octane-boosting ingredient of gasoline. But, individually, each of the three isomers commands a premium. And refiners are eager to collect it.

All Three Working: This potential of the xylenes has long been apparent to the oil industry. Standard Oil (California) saw it back in the late '30's. In 1945 it started production of phthalic from *o*-xylene.

The success of polyester fibers (Dacron) and film (Mylar) based on terephthalic acid (derived from *p*-xylene) gave the second member of the family a job in chemical plants. But still needed then was a chemical use for *m*-xylene.

Oronite, California's chemical subsidiary, took care of that by putting up its $10-million, 50-million lb./year plant to make isophthalic acid from *m*-xylene. Located next to its refinery at Richmond, Calif., the plant has been in production now for almost a year.

And now Indiana is assuring the xylenes of a busy chemical future by its decision to build a $10-million plant to oxidize all three isomers (*CW, Nov. 22, '56, Technology Newsletter*). Based on Scientific Design's and associates' liquid-phase air oxidation, the plant will make benzoic acid, phthalic anhydride, isophthalic and terephthalic acids as well as their dimethyl esters. Rated capacity: 60 million lbs./year at Joliet, Ill.

Present annual production of the phthalic acids is pegged at 450 million lbs. of phthalic anhydride (mostly from naphthalene), 50 million lbs. of isophthalic and about 75 million lbs. of terephthalic.

More to Come: But signs indicate that more is in store for the xylenes. One good indication is the large amount of research to uncover new uses.

Here are some of the things that may be coming out of this work.

- Polyamides based on hexamethylenediamine and isophthalic acid.
- Films and fibers based on adipic acid and *m*-xylylenediamine (U.S. Patent 2,766,221). Oronite offered the diamine last year at the development price of $2.50/lb., with the announced intention of building a larger plant—should the market warrant it—that would yield the chemical for 50-70¢/lb. (*CW, July 28, '56' Technology Newsletter*). Presumably, it makes the diamine by ammoniating isophthalic acid, then hydrogenating the resulting nitrile.
- Films and fibers based on blends of isophthalic and terephthalic. Goodyear has had a research program in this field for five years. Although it emphasizes that its program is still at the research level, it is enthusiastic about its film work.
- Polyesters that employ terephthalic acid rather than DMT (dimethyl terephthalate). Celanese has worked up a process using ethylene carbonate.

Making the Phthalics: Also indicative of what may be in store for the xylenes and their derivatives is the amount of process-development work being done on methods of making the phthalics. Richfield has had a process ready for some time, is still exploring the market. Celanese makes no bones about the fact that it's interested in polyester fibers made with terephthalic acid and the oxidation process to make the acid.

There's a considerable amount of development work, too, on methods of making the phthalics from non-xylene starting materials. But the markets for the phthalics are potentially big enough to provide room for more than one starting material. In the final analysis, competitive processes from non-xylene raw materials might help expand the market for both.

In any case, Hercules, which now makes DMT from *p*-xylene, is pilot-planting the Henkel process for making the acid from toluene. Scientific Design has a phthalic process that starts with di-isopropyl benzene. Shell, in Amsterdam, is pilot-planting its version of the same thing. And I. C. I. has developed a process starting with di-isopropyl benzene. VEB Hydrierwerk Zeitz, East German splinter of Henkel, has developed an exotic route to terephthalic from toluene.

Market Balance

How much xylene is produced in the U. S.? "That's like asking: How long is a piece of string?", says Bill Elwell, Eastern manager of Oronite's Product Development Dept. "It's as long as you want to make it." George Harrington, general manager of development for Amoco Chemicals, says substantially the same thing: "I've tried to find out the same thing. I've reached the conclusion that about all you can say with any certainty is that there's a lot more than anyone will ever want to use for the manufacture of chemicals."

The fact is that prodigious amounts of the xylenes are produced—along with benzene and toluene—from the catalytic reforming of naphthenes or paraffinic hydrocarbons. Every "cat" reformer in the country turns out xylenes—in amounts that vary with the crude being charged and with the particular reforming process that's used.

Xylenes are separated from the heavier aromatics after benzene and toluene are taken off.

Nine Ways to Make Aromatic Dicarboxylic

COMPANY	PROCESS	FEED	PRODUCTS
1) Du Pont[1]	nitric acid oxidation	*p*-xylene	terephthalic acid
2) Hercules[2]	two-stage air oxidation	*p*-xylene *m*-xylene or mixtures	dimethyl terephthalate dimethyl isophthalate
3) Oronite	vapor-phase oxidation[3]	o-xylene	phthalic anhydride
4) Hercules	Henkel disproportionation[4]	toluene	terephthalic acid
5) Oronite	sulfur ammonia	*m*-xylene *p*-xylene or mixture	isophthalic acid terephthalic acid
6) Standard Oil (Indiana)	liquid-phase air oxidation	o-xylene *m*-xylene *p*-xylene or mixture[6]	phthalic anhydride isophthalic acid terephthalic acid
7) Shell	liquid-phase air oxidation	di-isopropyl benzene[5]	terephthalic acid
8) VEB Hydrierwerk Zeitz	carbamide chloride	toluene	terephthalic acid
9) Richfield Oil	two-stage air, chemical oxidation	*p*-xylene	terephthalic acid

[1]Also, in Europe, I.C.I., Montecatini, Hoechst, Rhone Poulene
[2]Also, in Europe, Imhausen
[3]American Cyanamid and others are prepared to use *o*-xylene for phthalic anhydride processes in place of normal starting material, naphthalene.
[4]The alternate Henkel process (in which Hercules is not particularly interested) is the isomerization of phthalic acids.
[5]Shell Chemical in this country employs this process on a limited commercial scale to make *p-tert*-butyl benzoic acid from *p-tert*-butyltoluene.

sition will vary also. But in general, the ration of m- to p- to o- won't vary much from thermodynamic equilibrium. Average cuts will run: meta, 40-50%; ortho, 20-25%; para, 18-23%; ethyl benzene, 5-10%. Naphthenes and paraffins may also be present in amounts ranging from 7-45%.

A conservative estimate is that a billion lbs. are produced, only a fraction of which is separated. The Tariff Commission reports that in 1955, 96.1 million gal. of mixed xylenes were separated. These were worth $31.7 million as mixture. But, separated into their isomers and sold at reasonable market prices, they would have fetched $79 million. And, if the isomers were all used to make phthalics, they would have been worth $197 million (*see p. 32*).

In short, refiners have a chance to upgrade a 3-4¢/lb. product to one worth 12-13¢/lb. or, going another step, to a 25¢/lb. product.

Most refiners will admit that this is the basis of their interest. But they'll also say that it's an oversimplification.

Right off, they'll point out that there's the big problem of developing markets for all three isomers. And, just to make it tougher, the relative sizes of the markets should bear a close relationship to the ratio in which the isomers occur. Ideally, the demand for *o*-xylene should be the same as that for *p*-xylene. And each of those should be about half that for *m*-xylene.

Finding markets to these specifications is just about impossible, of course. So the refiner must resort to other possibilities. Fortunately, he has several ways out.

For instance, if he can develop a market for one or two of the isomers and still use the remainder as a solvent

Acids

STATUS

commercial

commercial plant at Burlington, N.J.: 12 million lbs./yr.

commercial

pilot plant

commercial

proposed commercial plant: 60 million lbs./year

pilot plant (Amsterdam)

pilot plant

pilot plant

[6]The Scientific Design processes include the use of di-isopropyl benzene as a starting material for terephthalic and a long list of mono-, di, and tri-alkyl substituted benzenes as starting materials for the corresponding mono- di- or tri-carboxylic derivatives.

or octane-booster, he gets the benefit of some upgrading. This is particularly true in the case of the *o*-isomer, for that's the first (and easiest) one to take off. The refiner could use that to make phthalic anhydride and the meta-para mixture for gasoline. In fact, it's possible to improve the octane rating of aviation gasoline by taking out *o*-xylene.

There's always the possibility, too, of isomerizing the xylenes to get more of the desired isomer. Although, right now, economics are against that measure, it might be economic to isomerize the phthalic acids.

In one version of the Henkel process, for instance, it is possible to convert the potassium salt of phthalic acid to terephthalic acid.

Another consideration for the refiner, however, is the possibility of getting to the phthalics through other starting materials—e.g., terephthalic acid made from toluene. That would mean that a refinery could gear its operation to fully exploit the xylenes while other raw materials took up the difference between the supply and demand.

Oxidation Problem

The difficulty of developing markets of the proper relative sizes isn't the only one that has kept the xylenes from a more important place in chemical planning. There's a big problem, too, in converting xylenes to useful intermediates.

The most logical way of making use of the unique structure is to convert the two methyl groups to carboxylic acid groups. But this is easier said than done.

One of the methyl groups goes easily enough. But for reasons that nobody has determined, the second group is more difficult to oxidize. This means that reaction conditions must be made more rigorous—and that may cause ring rupture, loss of yields.

The problem is not as great in the case of *o*-xylene, which forms phthalic anhydride, as it is for the other isomers. The anhydride appears to stabilize the ring, permit the use of fairly strenuous oxidizing conditions without too much sacrifice of yields.

Several companies have considered *o*-xylene as an alternate raw material to naphthalene in making phthalic anhydride. But, in general, they have not found the former route economic and phthalic production from *o*-xylene has been negligible. Exception: Oronite, which uses *o*-xylene, exclusively.

Oronite's vapor-phase process (U.S. Patents 2,521,466; 2,474,002) involves the use of low-surface catalyst supports as opposed to the high-surface ones (e.g., silica gel) used in naphthalene-based production. Because the operation is exothermic and because the temperature range is critical, a bundle heat exchanger packed with catalyst is used as the reactor. Molten salt removes the heat; sulfur dioxide fed in small amounts along with the air distributes hot spots more evenly and improves yields 5-10% (U.S. Patents 2,574,511; 2,574,512).

Bromine Activation: Another barrier to the utilization of the xylenes has been the difficulty in separating them. The ortho isomer can be distilled off, but separating the para and meta calls for a fairly complicated fractional crystallization.

Scientific Design's unique process apparently sidesteps both the separation problem and the problem of oxidizing the second methyl group. The process, says SD, can be used to oxidize a mixture of the xylenes.

This, as Scientific Design points out, was quite an achievement in itself. At the Fourth World Petroleum Congress in Rome (June, 1955), for instance, W. G. Toland and E. L. Nimer* said: "No single process appears to be completely satisfactory for the oxidation of all three isomeric xylenes to their respective phthalic acids."

What's more, the SD process manages to do the job with a one-step, liquid-phase air oxidation. The firm has never explained the method. Ralph Landau, executive vice-president and the key man in the process development work, merely says: "We've found a novel technique, a new principle."

Right now, this technique belongs to Standard of Indiana,** which paid a handsome price for it. And Indiana is going to great lengths to see that it remains proprietary.

Says Pike Sullivan, manager of Indiana's patent and development department: "We've hundreds of patents and patent applications in the mill. In fact, we're building quite a literature on the Scientific Design processes in this field. It would be difficult to say which elements of which patent covered our proposed commercial installation."

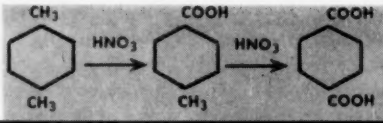
By the same token, it seems clear from the patents and applications already issued (Belgian Patent 546,191 and Australian Patent Application 16742/56) that the process involves

*In their paper "The Recovery and Oxidation of Isomeric Xylenes," an excellent critical view of the field up to that time. Toland and Nimer are members of Standard Oil's research arm, California Research Corp. Their paper was delivered by A. L. Lyman, president of the firm.

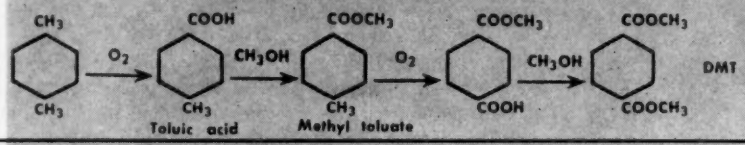
**But also licensed to Pechiney in France and Mitsui in Japan. Although Indiana now has exclusive world rights, Pechiney had previously bought rights from Scientific Design.

How to Oxidize the Second Methyl Group, and

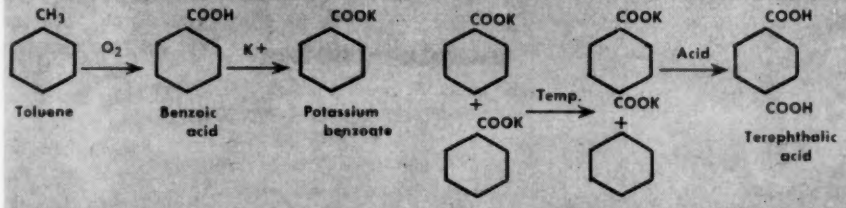
1— DuPont



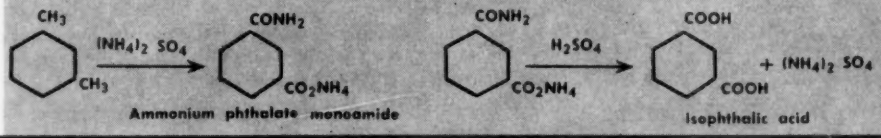
2— Hercules



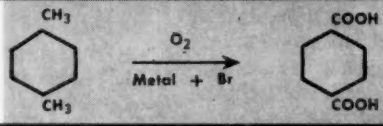
3— Hercules



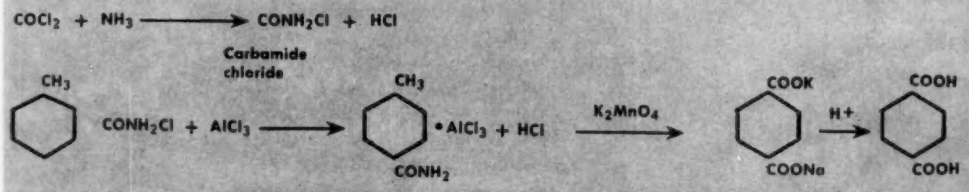
4— Oronite



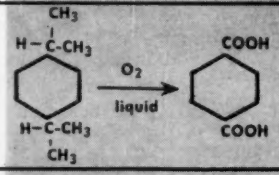
5— Indiana Standard



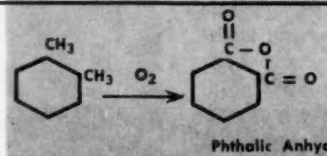
6— VEB Hydrierwerk



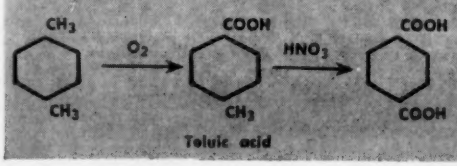
7— Shell



8— Oronite



9— Richfield



Why It Works

Nitric acid oxidation is selective.

Esterification of the toluic acid permits second-stage oxidation to proceed in good yield.

Conversion of benzoic acid to its potassium salt; under heat, the salt disproportionates.

Chemical oxidation is selective. Also, presence of amide group may facilitate second oxidation.

Bromine activates the metal catalyst, enabling the reaction to go in one stage under moderate conditions.

Ester group presumably facilitates oxidation. Also, permanganate oxidation is more selective.

Isopropyl groups on the benzene ring are not as difficult to oxidize as are methyl groups.

The anhydride is stable in vapor-phase oxidation, which would chew the ring of toluic acids.

First reaction is halted at toluic acid and second stage is carried out by nitric oxidation.

bromine activation of a heavy metal catalyst (*CW, Technology Newsletter, March 9*). By using both the metal and the bromine, the firm has been able to obtain some unusual results.

For example, here's how one experiment cited in the Australian application was carried out: 48.8 parts of xylene (95% para) and 125 parts of acetic acid were charged to a reaction vessel along with 0.6 parts of manganese acetate and ammonium bromide. Air was passed through while the reaction mass was held at 195 C for two hours at a pressure of 200-400 psig. The yield of terephthalic was 75% of theory.

The same patent application gives an indication of the versatility of the bromine-and-metal technique. It says that the same method can accommodate a wide range of starting materials including: alkyl groups on compounds having more than one ring (e.g., naphthalene, diphenyl, triphenyl); alkyl groups higher than methyl (ethyl, propyl, butyl and higher); tri-substituted aromatics to make trimesic acids. And it can be used to make intermediate oxidized products—alcohols and aldehydes.

That undoubtedly explains why Indiana says it was attracted to the process because of its flexibility. But the same flexibility also poses some problems. One is the question of markets. Where isomers are separated before oxidation, it would be "ideal" to develop markets related in size to the occurrence of the products. Where a mixture of isomers is oxidized, this would be imperative.

Then there's the problem of separating the oxidized products. Oronite has shown that it's possible to separate the iso- from terephthalic acid by the differences in solubility of their tertiary amine salts (U.S. Patent 2,664,440). The Texas Co. has worked up a separation based on their differences in rates of esterification (U.S. Patent 2,569,440).

But all who have tried separating the acids agree that it's no small accomplishment to get them out economically in sufficient purity. And purity requirements for fibers are particularly stringent. Indiana, which is playing the whole project very close, dodges the question as to whether it plans to charge a mixed feed or whether or not it can produce a product of "fiber" grade. The use of acetic acid as the medium of the reaction, however, would seem to give it a start on the separation and purification at least of terephthalic which is insoluble, even in hot acetic.

Hedging Against Oil: Hercules successfully gets around the problem of oxidizing the second methyl group by an entirely different approach in its commercial operation at Burlington (N.J.), where it makes DMT, much of which is sold for Canadian production of Terylene (English and Canadian version of Dacron). And it's busy pilot-planting the Henkel process for making terephthalic acid.

In its commercial plant (*CW, Jan. 30, '54, p. 64*), Hercules is operating under a process licensed by California Standard (U.S. Patents 2,653,165 and 2,772,305), probed independently in Germany by Imhausen.

In this process, the *p*-xylene is oxidized in the liquid phase with air to form toluic acid. That's esterified with methanol to form methyl toluate. This, for some unknown reason, facilitates the air oxidation—also in the liquid phase—of the second group to produce the monomethyl ester of terephthalic acid. And that can either be converted to the acid or esterified again to form DMT.

The same process can be adapted to the production of dimethyl isophthalate.

In the Henkel process it is pilot-planting, and which some regard as a highly economical route to terephthalic, Hercules starts with toluene. That's oxidized to benzoic acid which is converted to its potassium salt.

Then, under heat, two moles of the potassium benzoate disproportionate to produce one mole of benzene and one mole of dipotassium terephthalate. The latter is treated with acid to "spring" the free acid.

To understand Hercules' interest in the Henkel process, you must remember that—unlike the two Standard Oil Co.'s—it has no captive source of raw materials. And—unlike Du Pont—it has no captive outlet for the product in fibers.

This is how the company's Synthetics Department sees it: "We think that making the acids from xylenes is a logical procedure for the oil companies. But we like the thought of starting with toluene at 4.5¢/lb., in-

stead of *p*-xylene at four times that. We also like the thought of starting with a material that can be obtained from coke ovens as well as from refineries."

But Hercules freely admits the problem is more complicated than that and there are many factors that Hercules must take into account in weighing the two processes. Among them:

- Although the Imhausen process is a slick way of getting around the tricky oxidation, conversion at each of the two stages is only 30-50%. By using high recycles, the yield on *p*-xylene is high (up to 90%). But in the case of *m*-xylene, it falls to 75-80%.

Hercules, however, doesn't feel that these figures are necessarily the best that can be obtained. It is, in fact, working to improve them. Scientific Design's work on catalyst activation should be encouraging to anyone wrestling with the problem.

- Although the Imhausen process can turn out the acid, it would mean the waste of the first esterification step. This process's usefulness is generally regarded as being confined to the production of the di-ester. That's fine for terephthalic where, because of its increased solubility and lower melting point, the ester is the material used.

But the isophthalic acid is considerably more soluble. Even in the case of terephthalic, there's a possibility that the acid may wind up as the product of choice for polyester production (*see box, below*).

- On the other hand, although the Henkel process does turn out acid, it is limited to the production of terephthalic.

- Helping to counteract the lower raw material cost of the Henkel process is the fact that it is a multistep process and entails a higher investment per pound of product.

Same But Different: Oronite has spent considerable time and money on the problem of oxidizing the second methyl group in *m*- and *p*-xylene. It has come up with at least two solutions: the alternate oxidation-esterification which it licensed to Hercules, and the sulfur-ammonia process which it believed more suitable for its own particular set of operation variables.

This well-patented process (U.S. Patents 2,722,473; 2,722,546; 2,722,547; 2,722,548; 2,722,549; 2,734,079) may be aided by the same principle—that a functional group facilitates the oxidation of the toluic acid. But there's a world of difference in the way it's exploited.

One mole of *m*-xylene is reacted with a mole and a half of ammonium sulfate and a sulfur compound in which the sulfur has a valence less than six. The reaction is carried out at 300-350 C. and 2,500-3,000 psig. for an hour.

The product of this initial reaction is ammonium phthalate mono-amide in good (90%) yield plus a mole and a half of hydrogen sulfide and a mole of ammonia. The mono-amide is sprung to isophthalic acid with sulfuric acid. This also regenerates a mole of ammonium sulfate. (The other half mole necessary for the first reaction may be regenerated by oxidizing the hydrogen sulfide produced in the first reaction to sulfuric acid and ammoniating that).

The conversion of the mono-amide to isophthalic is done in three stages at 240 C and 500 psig. Doing it smoothly on a commercial scale was the trick—it took Oronite six months to shake down the plant.

Nitric Oxidation: A pet way of oxidizing the xylenes is by means of nitric acid. It's the method employed by Du Pont, I.C.I., Montecatini, Hoechst and Rhone Poulenc. Du Pont's commercial process (U.S. Patent 2,636,899), for instance, is characterized by the use of dilute (about 30%) acid, high temperatures (around 200 C) and critical pressure control (between 1 and 2½ times the vapor pressure of water under the reaction conditions). Under those conditions, part of the *p*-xylene is being oxidized to toluic acid while part of the toluic acid is being oxidized to terephthalic acid. Yields by this process are high—85%, or even higher.

Nitric acid oxidation can also be applied to *m*-xylene for making isophthalic. But yields are only 75-80%.

Half and Half: The process employed by Richfield is a compromise between air and nitric oxidation. The first methyl group is oxidized with air in the liquid phase (U.S. Patents 2,696,499; 2,712,549; 2,712,551) while the second group is oxidized with nitric (British Patent 747,417).

During discussion at the Fourth World Petroleum Congress, Robert Aries of Aries and Associates reported experience on a similar process on the continent of Europe.

He reported a liquid-phase air oxidation of *p*-xylene to toluic acid at 5 atmospheres using 0.3% of cobalt naphthenate as catalyst. The toluic was oxidized with 20% nitric; the yield, he said, amounted to 95%. He also mentioned a smaller nitric-acid-oxidation unit giving over 90% oxidation. In this same installation, he said, mixed xylenes were oxidized and the products separated. One separation process involved the use of nitriles.

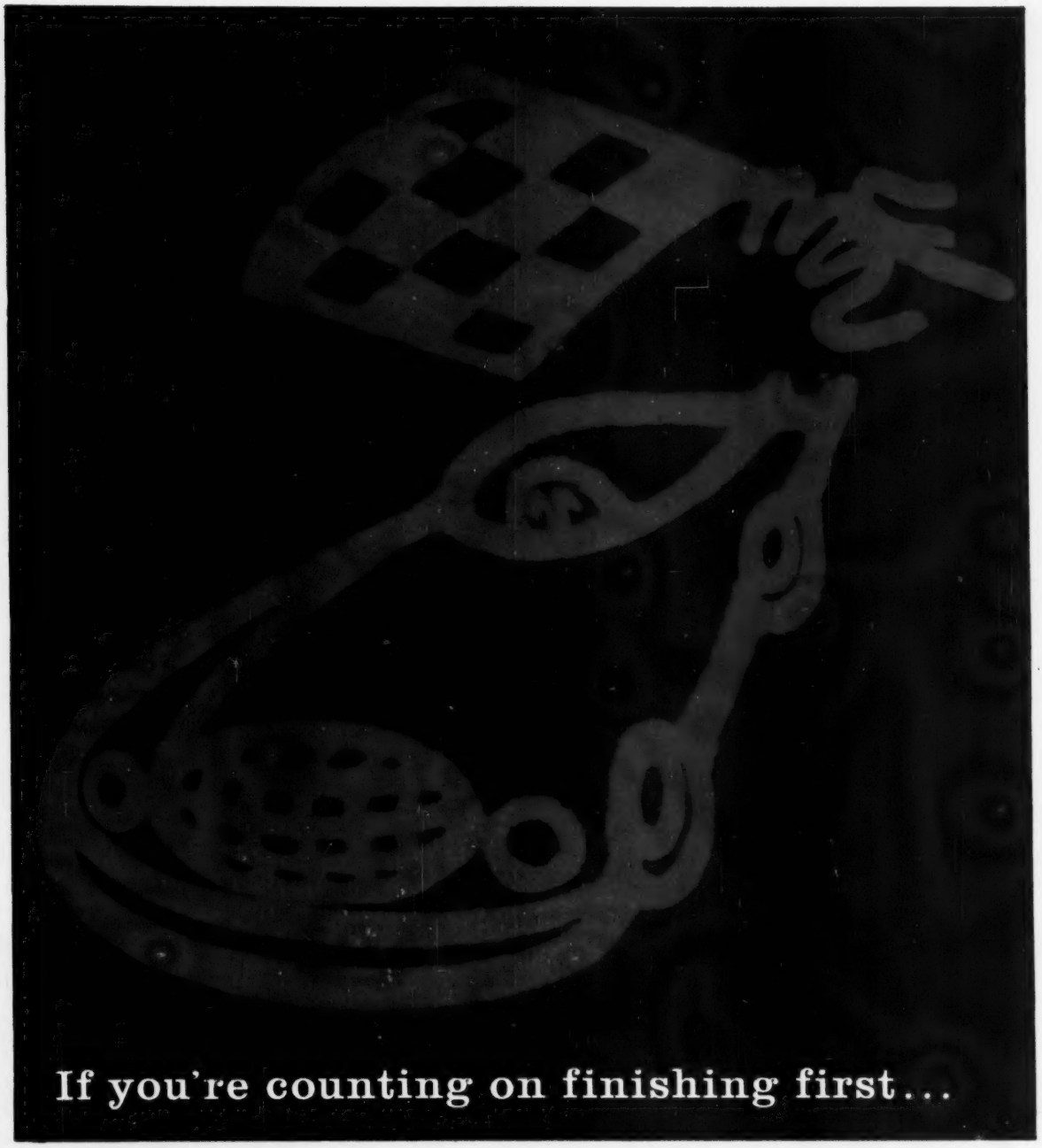
Aries now says he has a liquid-phase air oxidation, but gives no indication of how he does it.

Sidestepping the Problem: Another way of circumventing the difficulty of oxidizing the second methyl group of

How to Use Terephthalic in Polyesters

Because it is so insoluble, terephthalic acid is not used in the production of linear polyesters. The more-soluble dimethyl ester is used instead. British Celanese, however, has patented (British Patent 707,913) a process for making linear polyesters that employs the acid directly. Key: cyclic ethylene carbonate in approximately mole-for-mole quantities. The hot carbonate (a good solvent for acrylics, incidentally) dissolves the acid and then participates in the reaction.

How good is this process? "It's purely a function of the price of pure terephthalic acid," says Robert Armstrong, vice president and technical director of Celanese. "When the acid is available in the right purity at the right price, it will be more economical to make polyesters that way." He artfully dodges the question of just what the right price is, however.



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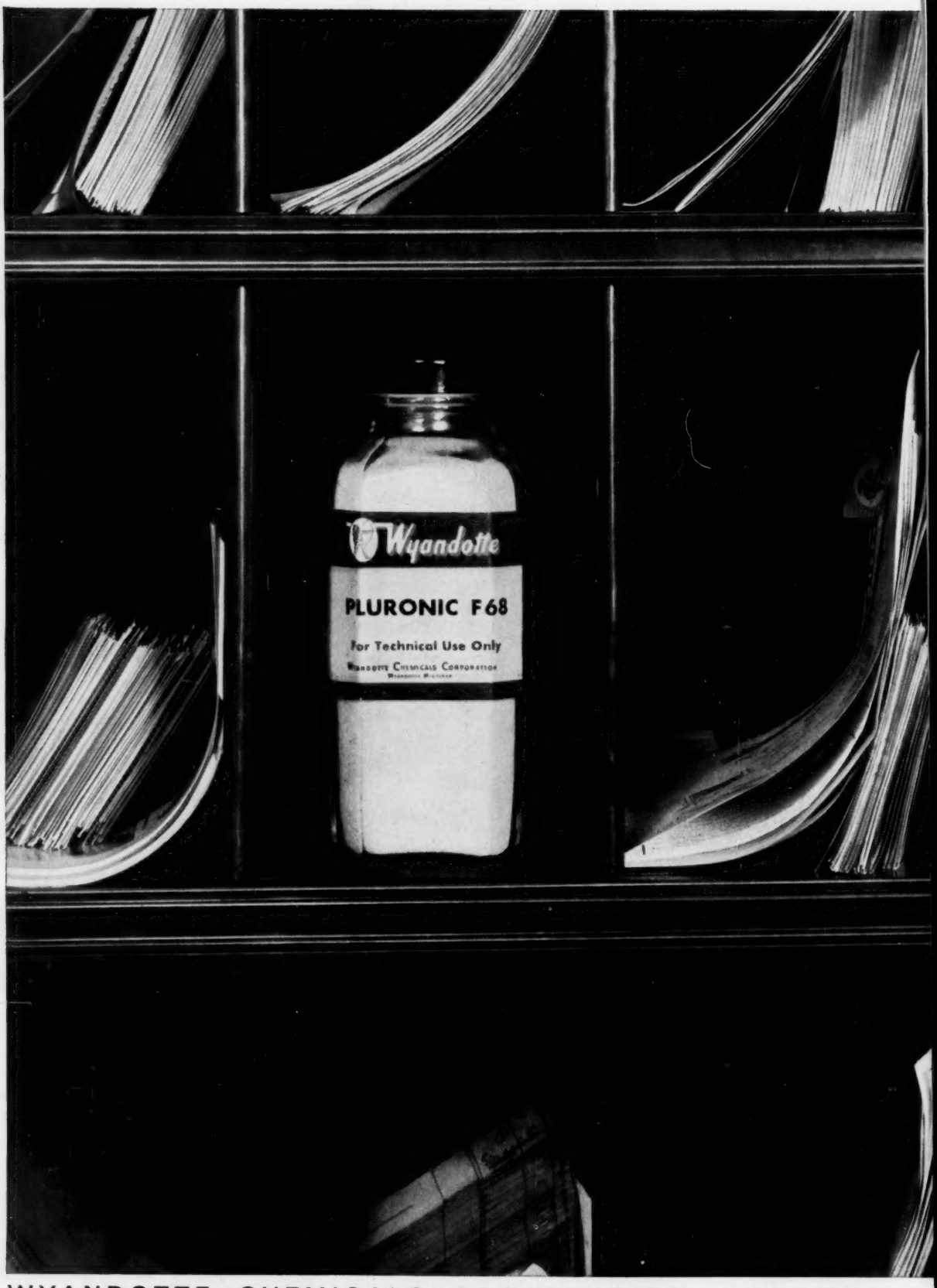

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the xylenes is to use a different raw material. And there's a considerable amount of process development along those lines.

Di-isopropyl benzene, in particular, has nailed down a lot of attention as a potential starting material for the phthalics. Scientific Design, in fact, devoted its earlier efforts exclusively to that material.

Landau and his colleagues developed a method for adding propylene to benzene to form di-isopropyl benzene, and laid out an oxidation program. Just as nobody understands why the second methyl group of the xylenes doesn't easily oxidize, nobody knows why the second propyl group in di-isopropyl benzene does. But Landau found that to be the case and says, "We're convinced, on the patents that have issued so far, that we're the first group to have researched that path to terephthalic acid."

In any case, it was during this work that the SD workers uncovered their "new principle." The di-isopropyl benzene process was included in the sale to Indiana.

Bataafsche, a member of the Shell group, has developed its own version of a process starting with di-isopropyl benzene. It's being pilot-planted in Amsterdam. According to Shell, the process is actually an extension of Shell Development's work on oxidizing *p-tert*-butyl toluene. A liquid-phase cobalt-catalyzed air oxidation, the latter process is used on a modest commercial scale at Shell Chemical's Martinez (Calif.) plant to make *p*-tertiary butyl benzoic acid.

I.C.I. has also done work on oxidizing di-isopropyl benzene. Its process, however, employs nitric acid as the oxidizing agents (Belgian Patent 536,-199). It has also researched an air-oxidation process.

The Exotic Route: Probably the most involved route to terephthalic that has been put forth thus far as a possible commercial process is the one devised by chemists of VEB Hydrierwerk Zeitz. Reacting ammonia with phosgene, they produced a carbamide chloride. By adding that to toluene in a Freidel-Crafts-type reaction using aluminum chloride, they form the amide of toluic acid. That's saponified with caustic soda and the remaining methyl group oxidized with potassium permanganate to form the sodium-potassium salt of terephthalic. Although they report that the saponification and permanganate oxidation can be carried out simultaneously, results were not so desirable.

Chemical men here, of course, shudder at the thoughts of using permanganate as an oxidizing agent in a commercial process. Even the East Germans who carried the process to a fair-sized pilot plant involving towers about five stories in height admit that it leaves something to be desired in the number of steps, the corrosive conditions and the cost of the materials (although the chemical values of the manganese, for instance, can be recovered). Importance of the process in this country is mostly academic, as it demonstrates the effort in Europe to develop processes that are independent of petroleum.

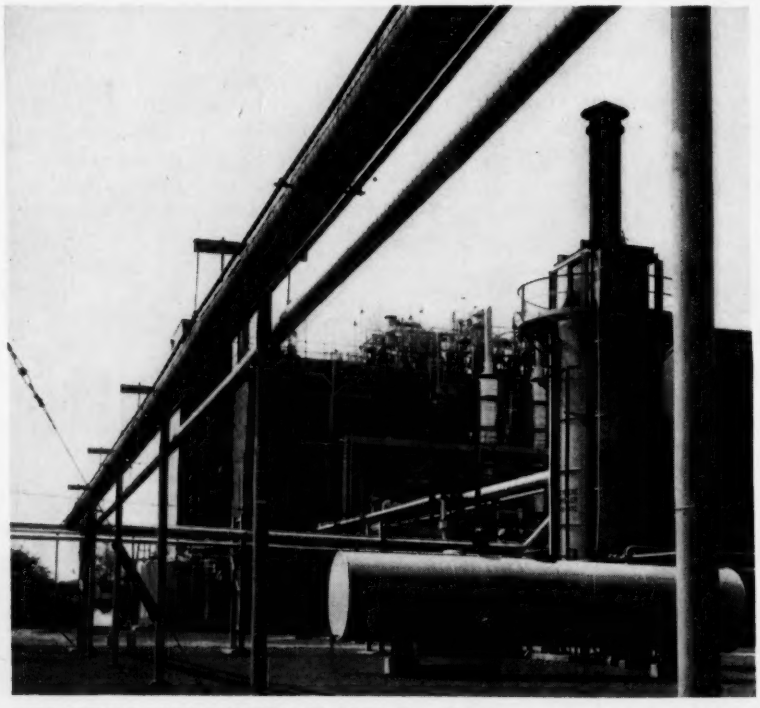
Questions for Tomorrow: It's fairly easy to see that current activity points straight toward a fuller utilization of the xylenes. But it's impossible to predict with any accuracy what process or what producer will be more important than the others.

Certainly Oronite, with its wealth of background in research and market development, will remain a dominating figure—as will Du Pont, because of its pre-eminent position in Dacron and Mylar. Hercules, too, is bound to figure importantly in any future moves. It has an established position in DMT, has done a considerable amount of development work on DMI. And it has reportedly already spent $2 million in piloting the Henkel process.

Indiana, with its slick new approach and its eagerness to succeed in chemicals, is a sound bet. Celanese, with its position in fibers and oxidation processes, must also be seriously considered. It has talked to Richfield (*CW Technology Newsletter, Feb. 11, '56*) about licensing a process. "But then," says Armstrong, "we've talked to everyone who has such a process."

Richfield is obviously anxious to make a place for itself in chemicals, and if its market probing turns up favorable information, xylenes may be its follow-up to benzene (*CW, Business Newsletter, March 30*). Shell and any number of other companies could also be important future producers of phthalics.

In short, handicapping the xylene field is a lot like handicapping a horse race. You have to judge past performances and a number of other variables. About all you can say with assurance now is that the track is fast.



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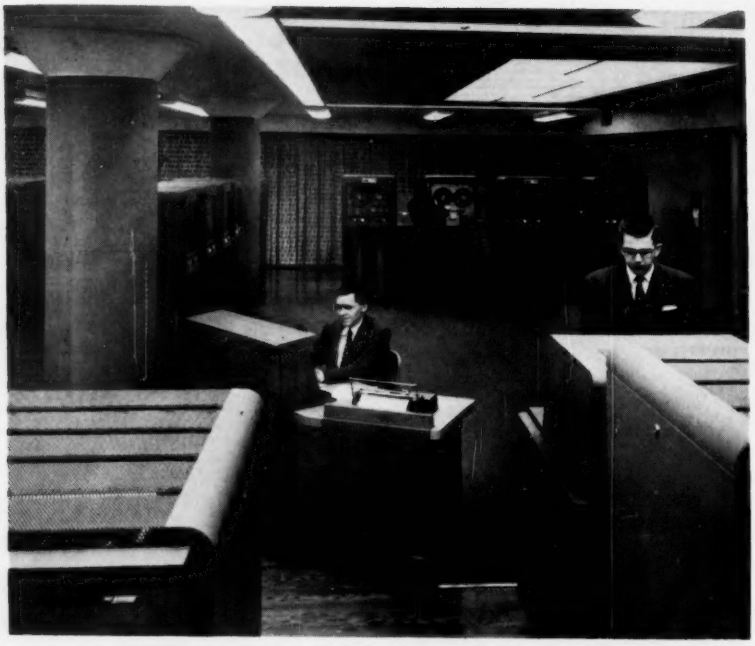


COMPUTER streamlines Monsanto's production scheduling by. . .

Helping Planners Decide

When it comes to coordinating the schedules of interrelated processes in a multiplant operation, a human manager can't match the speed and impartiality of a computer such as Monsanto's IBM 702 (above).

But, it takes thorough-going management preparation to put a computer on your production team.

Here, drawn to Monsanto's experience,* a timely lesson in how to adapt a computer to technical production problems.

Monsanto started preparing for computers seven years ago, completed the first commercial installation of an IBM 702 computer in March '55. As soon as the company had achieved its initial goal of mechanizing many of its routine accounting functions, it began to explore other types of applications in production.

Build a Staff: Establishing a staff group familiar with the various phases of work that might be profitably mechanized was the first step. Monsanto started its technical computer group with the hiring of a mathematician experienced in computer programing, has since added a chemical engineer and a second mathematician, one with an engineering background. It's the responsibility of this group to identify the areas to be mechanized, to consult with computer manufacturers for machine recommendations.

Testing the proposed program on an existing computer is the second step in the plan. By attacking typical technical problems on a rented machine, the company can verify dollar savings and/or improved control conditions that must be achieved to justify the cost of a computer installation. Such experimental runs may disclose additional benefits to be gained from mechanization of other manual or semi-manual procedures, or they may suggest completely new procedures that should be evaluated before computer specifications are finalized.

The third step—deciding on the type of machine required and whether it shall be rented or purchased—is mainly a question of economics. Companies that can't justify the outright purchase price of a computer (from $300,000 to $1.5 million) may rent computer time at fees ranging from $4,000-$30,000/month. Those who decide to purchase a machine, cautions Monsanto, should consider the risk of obsolescence in terms of potential applications.

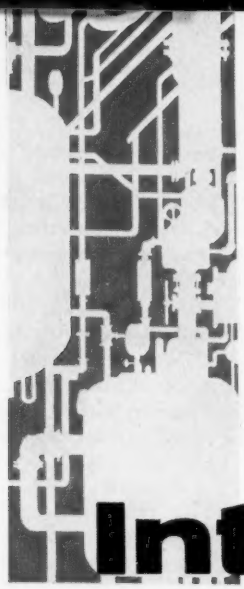
The cost of operating a computer facility is another important economic factor. For routine accounting work, it's necessary to train several employees in computer programing (Monsanto's computer accounting staff includes one supervisor, seven programers, three machine operators and five other clerical workers) or hire qualified programers. For scientific applications, mathematician-scientists are needed. In either case, says Monsanto, total salaries of a computer staff are approximately equal to the machine rental fee.

Programing Takes Time: Don't expect miracles, warns Monsanto—translating existing routines and systems into a form suitable for computer programing takes time. The company's experience in setting up computer-planned production scheduling for its Organic Chemicals Division is a good example:

Production scheduling for this division involves more than 500 chemicals produced in more than 1,000 grades at 13 separate locations. The computer's job: prepare a 12-month forward production plan, based on quarterly sales forecasts. The task was further complicated by the fact that many of the materials are produced in multipurpose equipment, and that many of the chemicals also serve as intermediates for other products.

Monsanto's computer group first considered using the machine to compute all possible permutations of the given production levels, eliminating those schedules in which production didn't meet requirements. But this method would have required some

*Reported by H. A. Hashbarger and N. L. Sample, of the company's Organic Chemicals Division, at the recent A.I.Ch.E. symposium in White Sulphur Springs, W. Va.



ACETALDEHYDE AMMONIA
ACETOPHENONE
ACETYL CHLORIDE
ANISIC ALDEHYDE
ANISYL CHLORIDE
ANISYL CYANIDE

BENZALACETOPHENONE
BENZHYDROL
BENZHYDRYLAMINE
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p-METHOXY PHENYLACETIC ACID
METHYL HEPTENONE
METHYL PHENYLACETATE
MYRISTOIL CHLORIDE
PALMYTOIL CHLORIDE
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PHENYL PROPYL ALCOHOL
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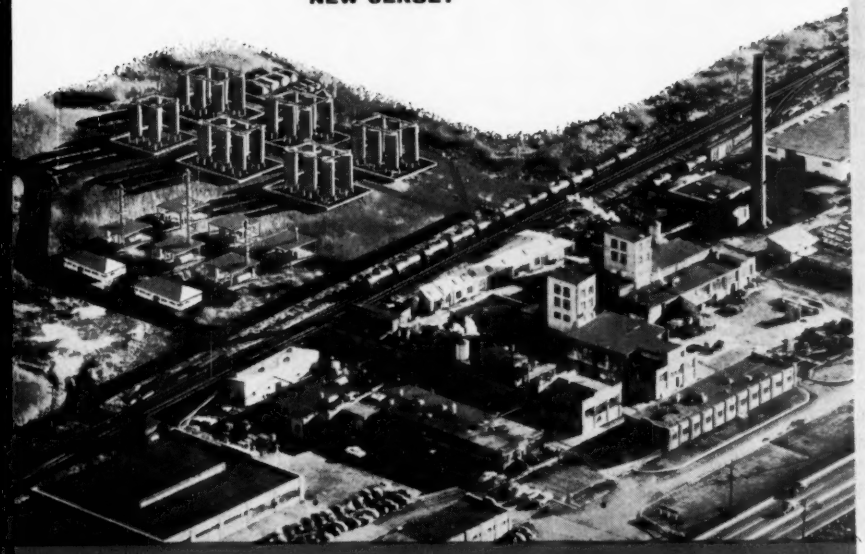

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340 hours of machine time to run off about 240 million schedules. It was discarded as impractical.

The computer group arrived at the workable method of handling individual products by developing procedures for classes of products. Three classes that permit relatively straightforward programing are:

- Minimum inventory—those products scheduled to maintain lowest possible inventory. This program can handle any number of production levels (5- or 7-day weeks, 2 or 3 shifts/day), including shut-downs.
- Two production levels—products scheduled to operate at one of two production levels in any fixed combination. Any type of monthly sales pattern can be handled.
- Optimum length of run—a special case of the second class, this method requires less computer time, is used wherever possible to schedule the work of departments that always operate at capacity rate or shut down.

Though it's easier to program production scheduling for single-use equipment, it soon became apparent to Monsanto that multipurpose equipment should be simultaneously considered. At one of its largest plants, some 70% of the products are made in multipurpose equipment. Scheduling of this equipment is now being evaluated by an extension of previously used graphical methods.

One of the greatest handicaps Monsanto's production planners faced was their unfamiliarity with programing requirements. Unaware of the machine's limitations, they often combined three or four steps into one. Separating the scheduling procedure into distinct successive programing steps required time-consuming examination of each step by the mathematician-programers.

After two major revisions and several minor ones to eliminate the bugs, Monsanto's original machine program turned out the data exactly as wanted. The program currently involves about 7,000 cards, requires about three hours of the 702's time.

Extend Applications: Once the computer has been installed, all sections of the company should be encouraged to seek new uses for the facility. Some of the major programs written for Monsanto's computer are shown above.

Potential applications are being identified at a much faster rate than they can be programed, says Monsanto. The company sees potential need for four more machines in the next five years.

With this kind of support, computers should have little difficulty winning more berths on the production team.

EQUIPMENT

Fine Filters: For removal of small particles from air and gas streams to a point approaching absolutely dust-free conditions, Flanders Mill, Inc. (Riverhead, N. Y.) now recommends its Air-Pure filter line. Filters are capable of removing 0.1-micron diameter particles, says Flanders, remove 0.3-micron particles at better than 99.95% efficiency. A selection of cellulose-asbestos, glass and ceramic filter media is offered to fit various conditions of use, including temperatures to 2300 F, without deterioration. Also available is a longer-life filter line, dubbed Flanderflex, that has slightly lower efficiencies, requires less maintenance.

•

Zirconium Descaler: Cro-Plate Co. (Hartford, Conn.) is now offering an automatic wet-blast unit for descaling zirconium parts. Unit includes variable-speed, reversible conveyor, blast cabinet and rinsing facilities.

•

Computer: Philco Corp. (Philadelphia) is out with Transac Type S-1000, a compact, lightweight, high-speed desk-model electronic computer. Transistors and printed circuit wiring are used throughout. Unit may be plugged into 110-volt, 60-cycle outlets, is mounted on casters for mobility. The computer generates little heat, says Philco, requires only a small fraction of usual air-cooling equipment.

•

Salt-Water Pump: Gould Pumps, Inc.'s (Seneca Falls, N.Y.) Fig. 3715 centrifugal pump is now available in aluminum bronze for salt-water pumping. Nine sizes, covering a wide range of capacities and heads, are offered.

•

PVC Fan: For moving air and gases that are loaded with corrosive chemicals, Chicago Blower Corp. (Franklin Park, Ill.) has come up with a new, centrifugal, radial-bladed fan made of PVC. Sizes from 12- to 40-in. diameter will move 200 to 10,000 cfm. of gases.

•

Air Strainer: Watts Regulator Co. (Lawrence, Mass.) offers its new Series 137 all-brass strainer for removing particles 90 microns and larger from air and gas streams, says it's particularly suited for keeping regulators clean. Pipe sizes: ¼, ⅜ and ½ inches; pressures: up to 500 psi.

•

Steam Trap: The new Monovalve float and thermostatic steam trap combines strainer, trap and check valve in a single unit, discharges condensate as fast as it forms, says Velan Valve Corp. (Plattsburg, N. Y.). Bimetallic element on floating holder shuts valve tight against saturated or superheated steam. Condensate lifts float, opens seat for outflow. Size range: ½ to 2½ inches.

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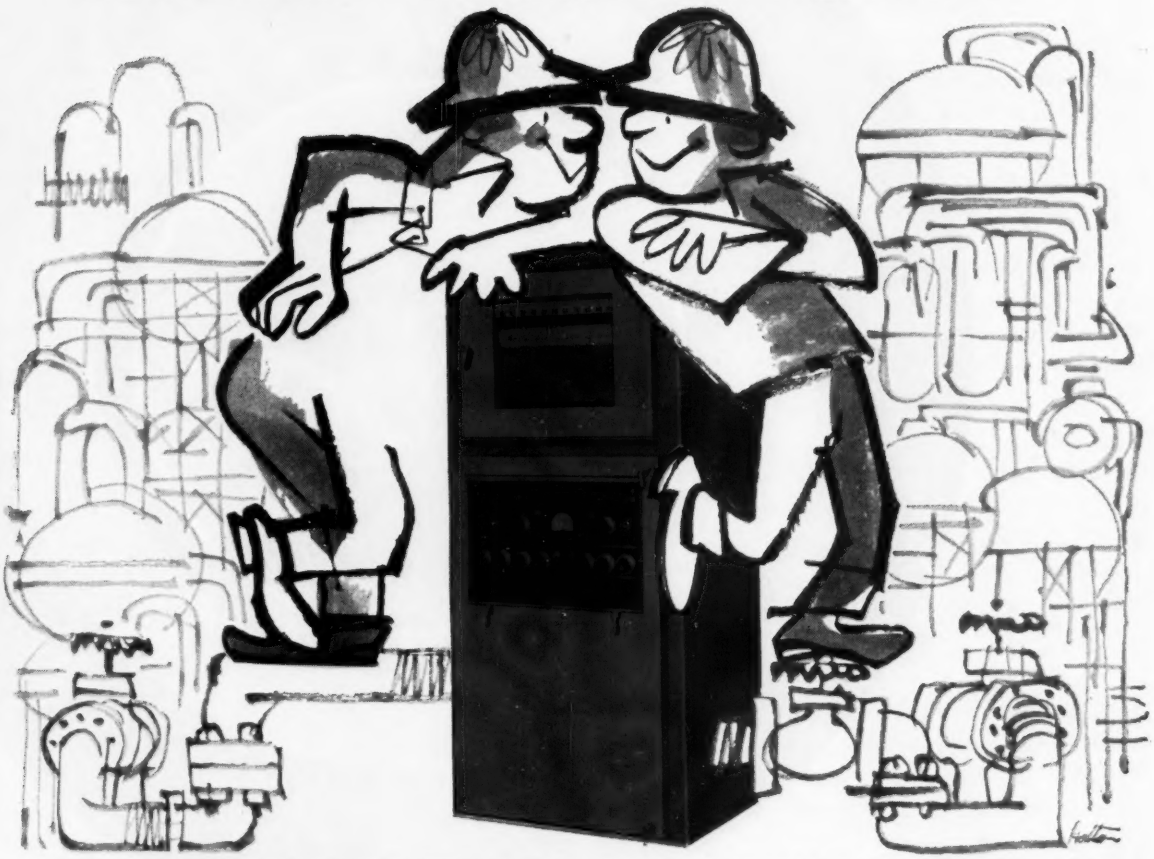

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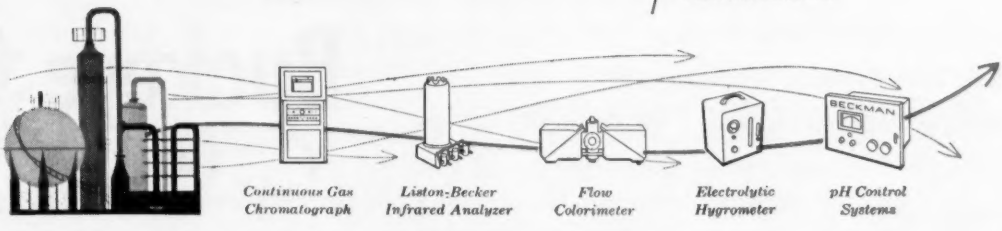

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CHEMICAL WEEK
April 6, 1957

Alien property return bills will get a full airing, but no action, when hearings open before a Senate Judiciary Subcommittee, April 4. The big push will be for the "full return" bill of Chairman Johnston (D., S.C.). It returns to original German or Japanese owners all vested property still held by the Justice Dept. and proceeds of property already sold. It must buck strong Justice Dept. opposition and divided Congressional opinion.

There's no jeopardy to the Justice Dept.'s sale (bids open May 13) of General Aniline & Film. If advocates of return win out in the end, the government would have to give up proceeds of the sale, but GAF's new owners would surrender nothing. That is, if a sale is made before any legislation becomes law. And that's a near certainty.

•

House liberals "took a walk" on the key vote that hacked all staff expansion funds off Food & Drug Administration's 1958 budget. They left a Southern Democrat-Republican economy bloc in command long enough to reverse a previous voice vote against the cuts. But, there's still a good chance of getting part, if not all, of the cuts restored. And the $500,000 request for new lab equipment wasn't touched.

•

The Louisville alcohol-butadiene plant won't be sold—at least not this year. Instead, a Senate Banking Subcommittee will take another unhurried look at the House-approved bill to make a general chemical producer of the plant. Even if the Senate okays the bill, there won't be time to complete a sale before mid-1958.

Subcommittee Chairman Douglas (D., Ill.) insists he will take an open mind into his new "late April" hearings. Right now, the top item to be considered is a farm-bloc bill introduced by Douglas last week. It would make Louisville, and other idle fermentation and butadiene plants (private and governmental) part of a five-year experiment in ways to produce competitive-priced alcohol and other chemicals from surplus grains.

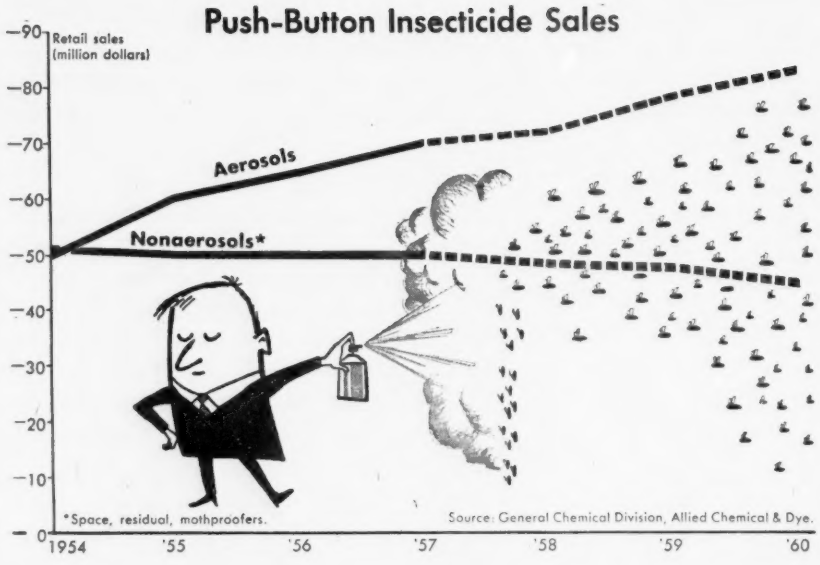
Publicker Industries is elated. Officials see victory in their fight to block Union Carbide or other chemical firms from getting Louisville. If it wins, Publicker has a good chance to buy or get a lease-extension on the plant under either of two plans:

- Douglas' alcohol-from-grain experiment bill. The plan would permit use of Publicker's big, idle Philadelphia fermentation plant to convert government grains to alcohol for use at Louisville.
- The subcommittee may yet decide to reoffer Louisville for sale or lease on terms restricting its use to butadiene production. And, Publicker is the only company likely to bid on that basis. The firm has asked the government to sell it 20-50 million bushels of surplus grain at 60¢/bushel. If the deal's accepted, Publicker could reopen both its fermentation plant and Louisville, make low-cost butadiene, butanol, feeds.

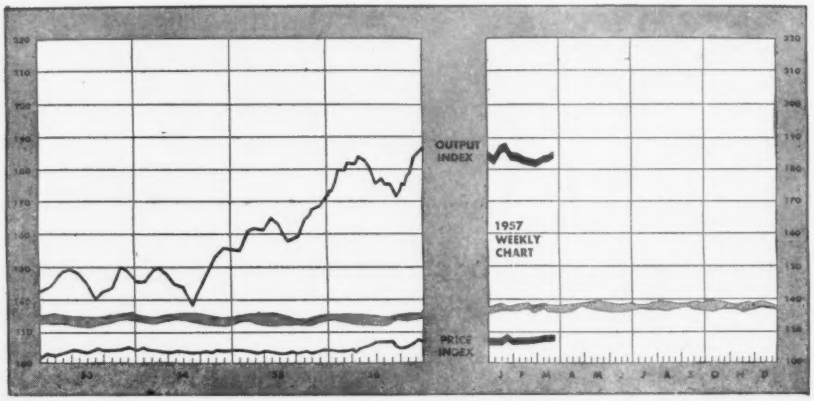
Charting Business

CHEMICAL WEEK
April 6, 1957

Push-Button Insecticide Sales



Packaged household insecticides will continue their steady sales growth, with the aerosol types riding the wave of popularity. Last year, American housewives spent $114 million for packaged insecticides. Some 56% of these sales ($64 million) went for aerosol insecticides, the remainder for the nonpropellent type. By 1960, however, retail sales of packaged aerosol bug killers are expected to hit $83 million, represent about 65% of sales of packaged insecticides.



Business Indicators

WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week Output Index (1947-49=100)	185.9	185.3	183.5
Chemical Week Wholesale Price Index (1947=100)	108.5	108.6	105.7
Stock price index of 11 chemical companies (Standard & Poor's Corp.)	41.27	41.79	50.78

MONTHLY PRODUCTION (Index 1947-49=100)	Latest Month	Preceding Month	Year Ago
All manufacturing and mining	147	145	144
All chemical products	188	183	179
Industrial chemicals	206	203	201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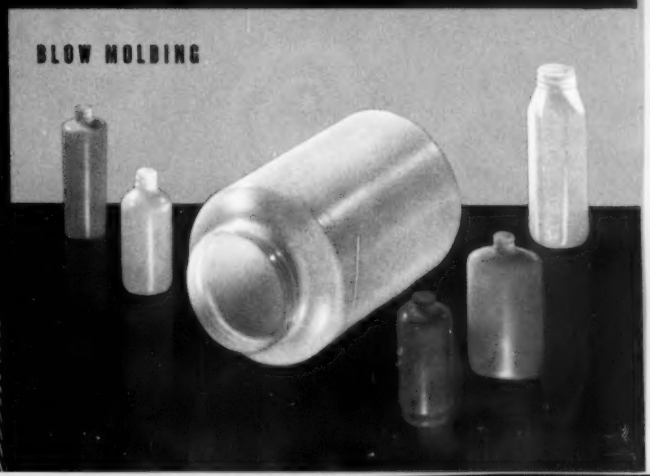

IMAGINATION HEADQUARTERS

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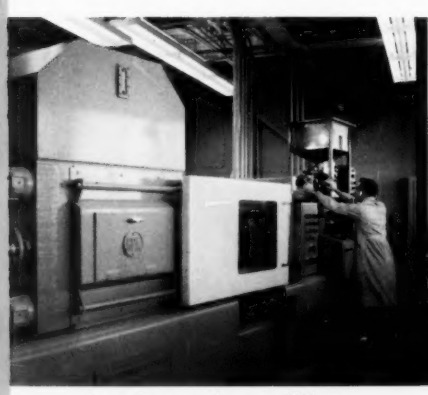

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BOB SEMPLE, BERT CREMERS: For the latter's Michigan Alkali Division, a $40-million expansion.

Seven Steps that Changed Wyandotte

The name's the same, but inwardly and outwardly Wyandotte has changed mightily since 1949. Its owners—descendants of company-founder J. B. Ford—that year brought in Monsanto-trained Bob Semple as president.

Since then, the firm has greatly increased producing capacity, reorganized its managerial lineup, and set up a much stronger research staff. Now, Semple predicts, Wyandotte is heading for still more growth, still higher earnings.

In seven years, Wyandotte Chemicals Corp. has been renovated and reconstituted. It's quite a change for one of the country's oldest (established 1891), largest (supplying 9% of alkalis and 5% of all chlorine for the U.S. market), and most closely-held (about 82% of common stock still owned by the founder's descendants) producers of basic chemicals.

Capsulized check-list on this transformation, which company President Bob Semple—formerly with Monsanto in such posts as petroleum chemical sales manager and director of development—calls "a seven-year evolution":

• The operating figures for last year—out this week—show that '56 sales of $79.6 million were up by 24.1% over the previous high in 1953. Net income ($4.4 million) was up by 34.8% over the previous record, set in '50.

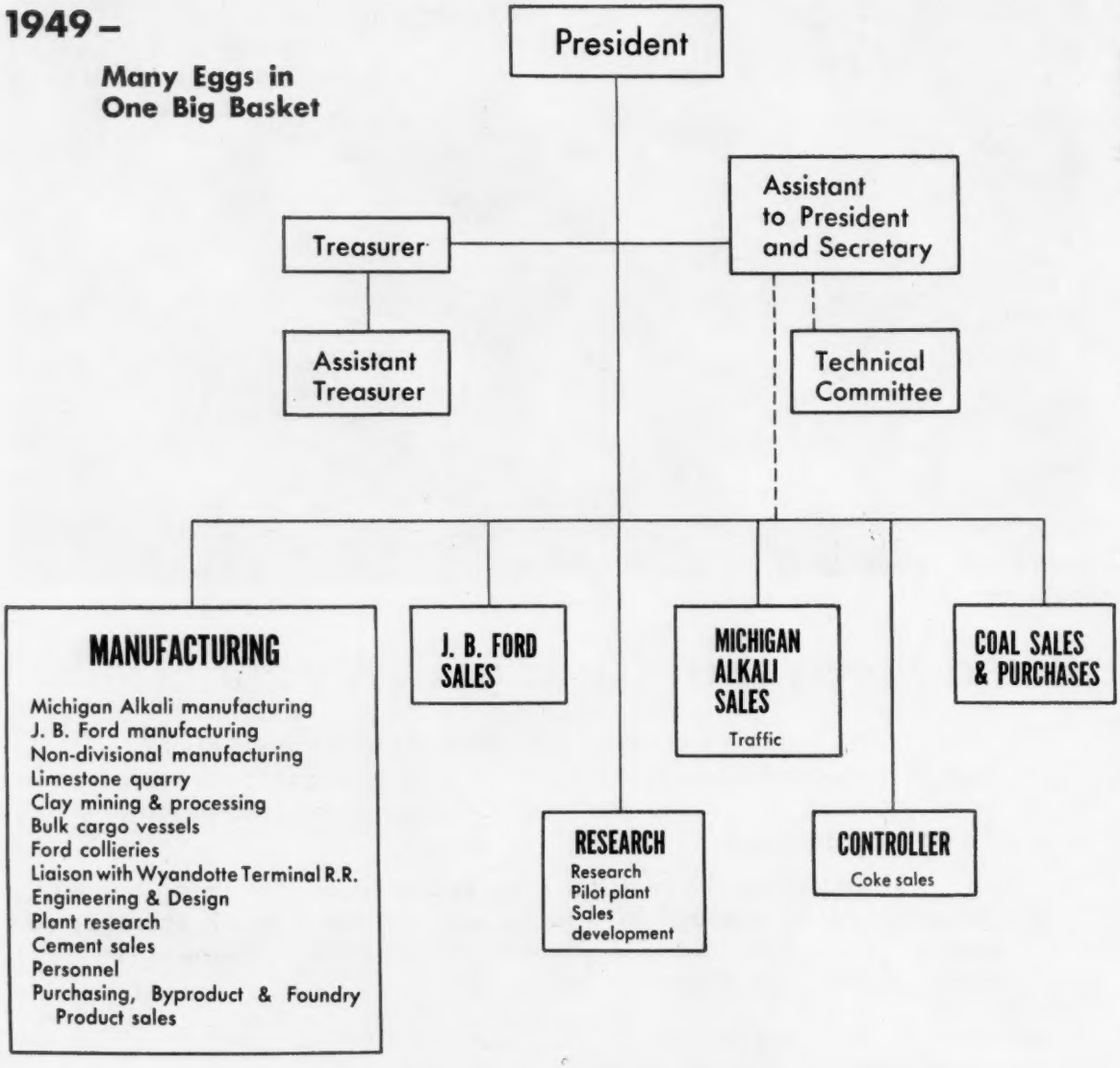
• A $50-million expansion program since 1949 has boosted the company's chlorine plant capacity by 80%, soda ash capacity by 30%. It also included modernization of the caustic and glycol plants to maintain the company's product quality position, and the addition of a new research laboratory with a 230-employee staff. Wyandotte, too, has built a new plant for the J. B. Ford Division (specialized cleaning products), gained title to a new brine field with 100-year salt reserves, and started to double limestone quarry capacity.

• In addition, the $32-million works under construction at Geismar, La., will raise the company's

HOW WYANDOTTE HAS

1949–

Many Eggs in One Big Basket



chlorine-caustic capacity 50% more and nearly triple Wyandotte's present ethylene oxide-glycol capacity.

• The company's organizational structure—previously lopsided because most of the operations were lumped together under "Manufacturing"—has been overhauled (*see charts, above*).

Switch by Workers: On top of all this, Wyandotte employees themselves have done something to further alter the shape of things. Just two weeks ago, the 2,100 workers in the company's largest production unit, Michigan Alkali, cut loose from the labor union that had been involved in one long strike and a dozen short walkouts in less than two years, and hooked up with an AFL-CIO union offering new leadership and a fresh start toward labor-management amity.

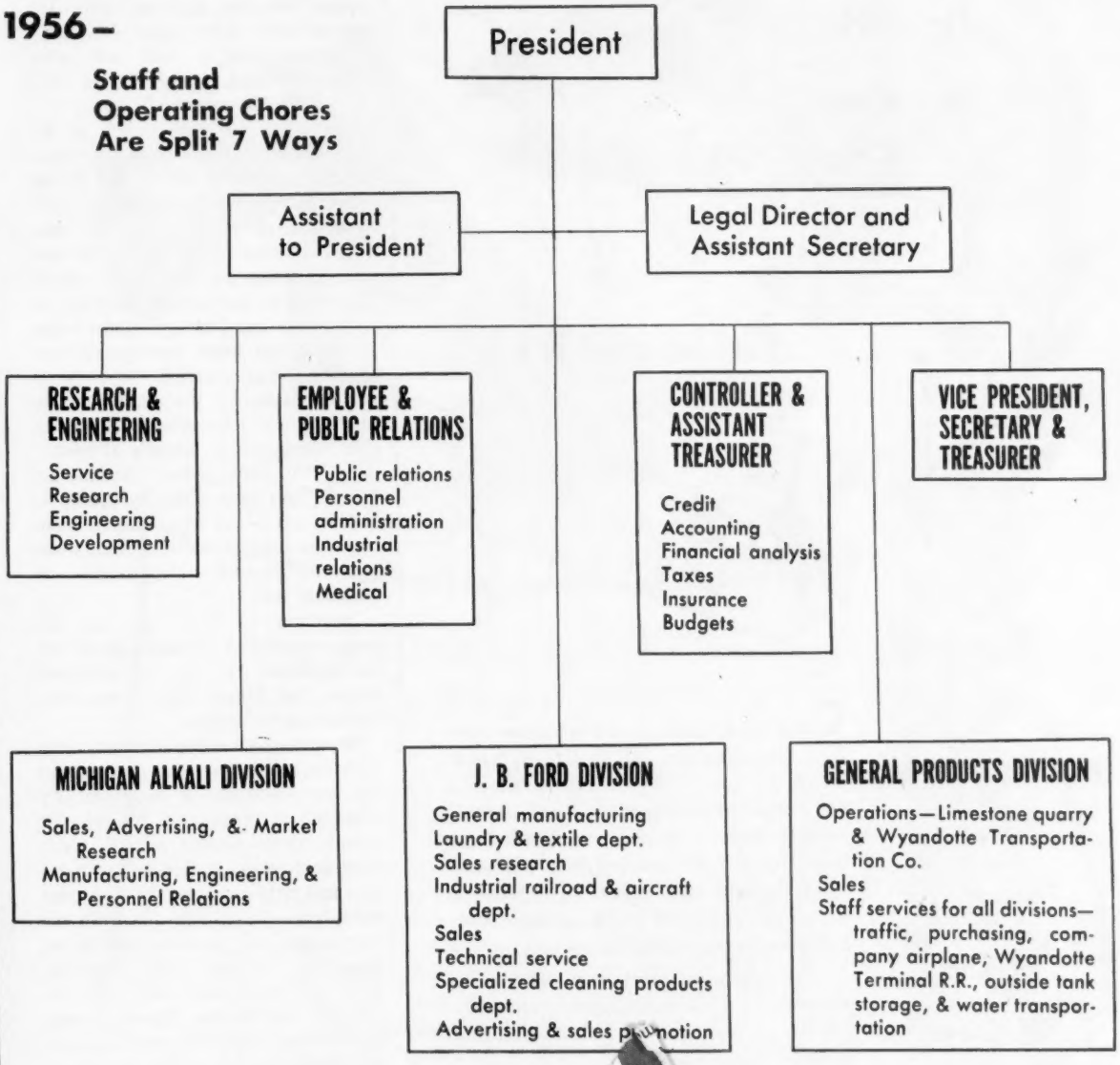
In retrospect, it can be seen that transformation of Wyandotte has come in seven major steps. Semple figures in all of them, although at least the first two were decided on by the Ford family before Semple left St. Louis. These moves: (1) the decision to start a general expansion program; (2) the decision to hire Semple.

Also, the owners recognized the fact that (3) some reorganizing was called for, although it wasn't com-

GEARED FOR GROWTH

1956–

Staff and Operating Chores Are Split 7 Ways



pleted (for the time being, at least) until last summer. The other principal steps: (4) beefing-up research and development into a primary company function; (5) selecting people to man the new posts in the refurbished organization; (6) attaining close working relationships with new and hold-over executives, and winning the cooperation of the production workers. Final step was (7) the public sale of stock, bringing Wyandotte a measure of public ownership.

Old Firm, Young Boss: Semple—a tall, slim, friendly St. Louisian with a master's degree in chemistry from MIT—was 39 when he took the helm of Wyandotte. The firm was then nearing its 60th year and had a net worth of more than $50 million. The combination of an old-line company and a youthful president seems to have worked out well for both, although there were trying times along the way. Possibly the darkest hour came during the first six months of 1955, when an 82-day strike resulted in a net loss to the firm of more than $1.4 million.

Since then, everything has been looking up. Second-half operations not only made up that deficit but also brought a nearly $1-million profit for the year as a whole. And that over-all 1955 net was very

nearly equalled in just the first quarter of 1956. At $26.50/share, the new stock offering last May was oversubscribed before its issuance; and since then, bid and asked prices have ranged between $33 and $36. The first dividend to the public—25¢/share—was declared in June, and subsequent dividend payments have been at about a 3% rate.

Later in '56, construction of the ethylene oxide-glycol plant got started on the 1,200-acre site on the Mississippi River below Baton Rouge. This unit is to go onstream late this year. The adjacent electrolytic chlorine-caustic plant on the same site is scheduled to start up sometime in '58.

Methods and Strategy: All the while, however, the firm's management setup was being modified. To assist in the reorganization project, Wyandotte turned to a management consulting firm, Worden & Risberg (Philadelphia). "A new president," Semple explains, "has some difficulty getting to the bowels of an organization; management counsel doesn't. Also, management counsel is expendable. A president isn't."

Selection of executives for the newly-established divisional posts was accomplished in part by personnel testing, but Semple doesn't lean very heavily on this system.

Semple's method for communicating with his executives is not unique, but the way in which it is assiduously practiced is noteworthy for what it reveals about Semple himself. Four days each week, he lunches with his left- and right-hand men in a pleasant restaurant—the cuisine "superb", the conversation all business, and the atmosphere informal. On Tuesdays, divisional heads lunch with their immediate subordinates. Monday-morning-meetings bring the entire management staff together in the Wyandotte board room for an agenda Semple compiles from notes jotted down during the past week. Division-heads give Semple monthly progress-and-problem reports and annual reports on coming-year goals.

"I'm a firm believer in goals," Semple says with great seriousness. "Without a goal, you don't know where you're going." Events of the past two years indicate that—after some wavering before then—Semple and Wyandotte now are pretty confident as to destination.

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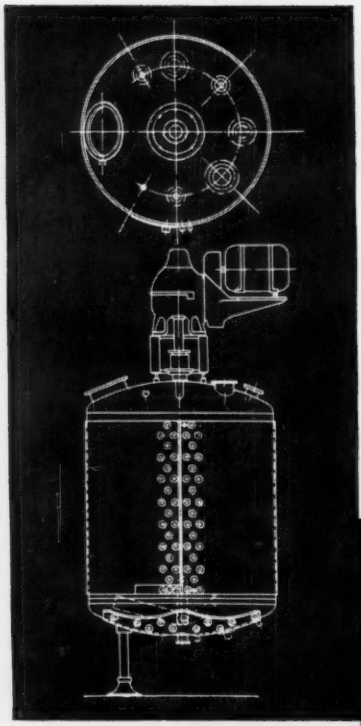
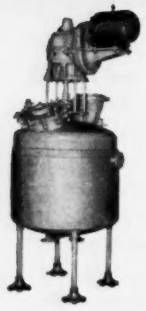


By themselves, catalog prices of raw materials can be misleading. For it's the final cost—in terms of service life—that really determines what you pay for equipment.

The following table, based on cost analysis by the Pfaudler Company, indicates their estimate of comparative costs of producing the reactor unit shown at the left, using titanium, and two other well-known, corrosion-resistant metals.

	REM-CRU A-55 TITANIUM	METAL A	METAL B
Cost per lb.	$14.60	$0.8025	$2.62
But titanium's light-weight means less is needed . . .			
Material Required	250 lbs.	785 lbs.	675 lbs.
So the comparative cost factor is reduced . . .			
Material Costs	$3650.00	$630.00	$1768.00
Fabrication takes the lions' share, so . . .			
Cost of Finished Reactor	$12,150.00	$2391.00	$4670.00
And in corrosive chlorides, hot acids, and many other environments, laboratory and service data show . . .			
Service Life	5 years	6 months	1 year
NOW . . . COST Per Service Year	**$2430.00**	**$4782.00**	**$4670.00**



Reactor unit of REM-CRU titanium built by the Pfaudler Co., Rochester, N. Y. and Elyria, Ohio a skilled fabricator of titanium and other corrosion-resisting materials.

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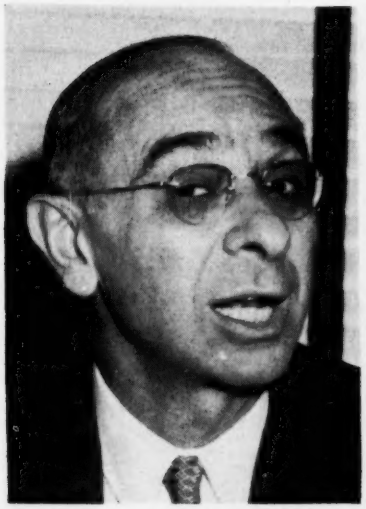


LEFKOWITZ: He's asking for state laws with stronger antitrust stand.

LEGAL

New Antimonopoly Law: New York State Attorney General Louis Lefkowitz has urged enactment of two state laws that would strengthen his hand in antitrust actions.

Lefkowitz asked the legislature to provide $50,000 to increase the Bureau of Monopolies staff and to strengthen state law to bring it into line with the federal Sherman Antitrust Act.

•

Tests for Canadian Drugs: A Canadian Senate committee has approved a narcotic control bill that will require, among other things, that every new drug be submitted to the federal Department of National Health for laboratory tests before being placed on the market.

•

Damages for Widow: A Common Pleas Jury at Mt. Vernon, O., has awarded a widow $125,000 in damages. Her husband, Marvin Frady, was killed in September 1955, in an engine explosion at the Cooper-Bessemer Corp. plant there.

The widow sought $160,000, charging that National Cylinder Gas Co. and Mansfield Oxygen Acetylene Supply Co., defendants in the case, sent a cylinder containing oxygen instead of nitrogen to Cooper-Bessemer, which used the oxygen in the engine, thinking it was nitrogen (*see also CW, March 10, '56, p. 54*).

PROLONGED ABSENCES IN INDUSTRY

What they mean to employers:

		Average number of prolonged absences per 1,000 employees per year
Men	Salaried employees	19
	Production workers	33
Women	Salaried employees	34
	Production workers	73

What they mean to employees:

	Average loss or cost per prolonged absence	
	Gross loss or cost	Net, after benefits
Wages or salary	$717	$323
All medical care costs	342	129
Total average net cost		**$452**

To minimize insecurity from this cause, chemical firms have

Increased by 71%
average group-insurance payments per employee (from $48/year in 1951 to $82/year in '55)

Increased by 101%
number of workers covered by paid sick-leave agreements (from 50,500 in 1951 to 101,400 in '55)

Increased by 64%
number of workers covered by hospitalization insurance (from 126,200 in 1951 to 207,200 in '55)

The Costs of Long Absences

Results of the first broad-scale survey of long-term employee absences show that industrial employers have a nearly $2-billion/year stake in absenteeism due to prolonged illness.

The five-year study has just been completed by the Research Council for Economic Security (Chicago). Thirteen chemical process companies participated in the survey. They and 15 other process industry firms were among the more than 250 corporate sponsors of the study.

Among the findings: that prolonged-illness absences—defined as those lasting four weeks or longer—cost employers an average of $25,104/year for each 1,000 employees; are more frequent among women employees than among men; are more common among production workers than among salaried personnel; and are much more frequent among older employees than among younger workers.

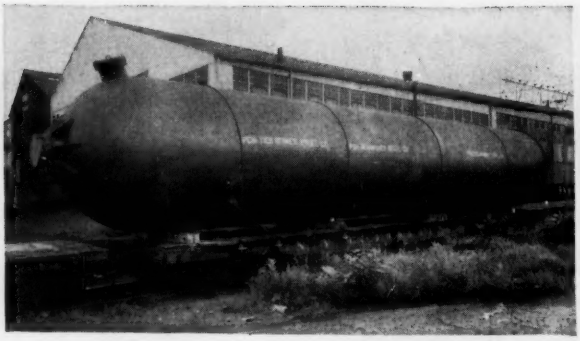
Losses in Production: From this, Research Director Leon Werch of the privately-financed, 12-year-old council concludes that "experienced [production] workers, in whom there is an investment of training and whose skills can least be spared, are more frequently absent."

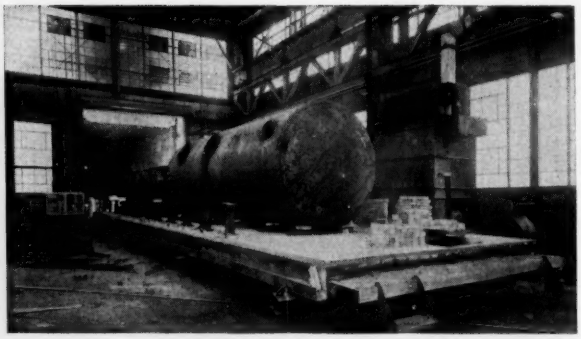
While the greater emphasis in the 237-page report on this survey is on the costs of prolonged illness to individual employees, there's also attention to what the findings mean to employers. For example, Werch notes that extra employees may have to be kept on the payroll to maintain production. Data on frequency and duration of prolonged-illness absences, he says, indicate that to compensate for such lost time, a company on the average needs 15 additional woman employees for each 1,000 women on production lines. For salaried women, 10 extra employees are needed per 1,000 workers; for male production workers, seven; and for salaried men, four.

Werch uses absentees' wage and salary rates—multiplied by time lost from work—to compute the cost of prolonged-illness absenteeism. However, he points out that the employer also loses varying amounts of production time. Too, "delays and inefficiency resulting when key personnel are absent may multiply the production loss."

Impact on Individuals: Among men, the most common cause of prolonged absence encountered in this survey was from diseases of the digestive system. This accounted for 1,043 out of the 3,769 cases. Among women, main ailment was genito-urinary-system diseases, 467 out of the 2,342 cases.

Average gross cost of medical care





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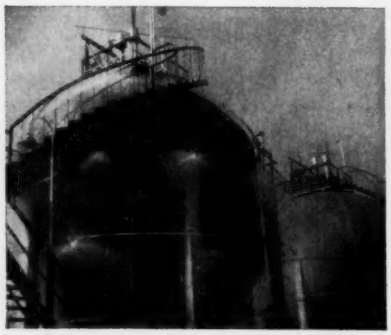

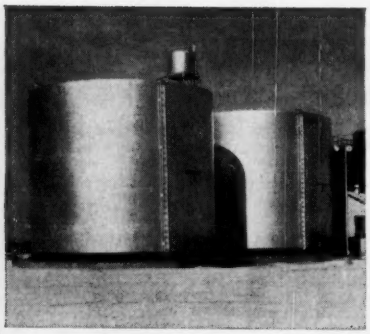

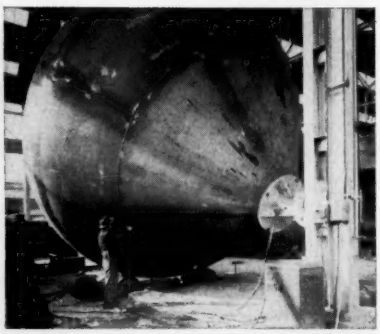

Plants at
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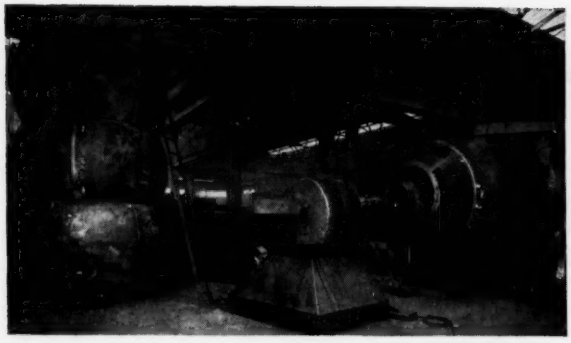

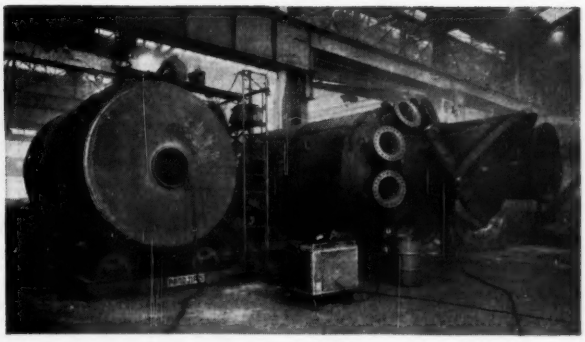

and the Chemical Process Industries

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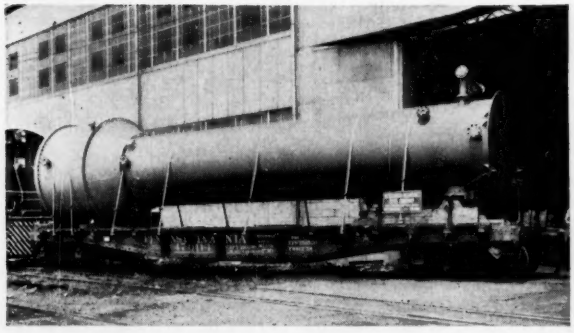
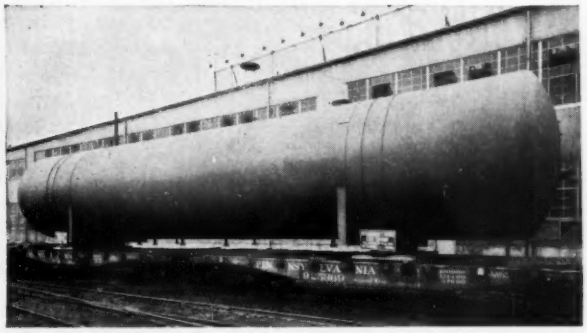
RESEARCH Pittsburgh-Des Moines for many years has maintained a full Chemical Storage Fellowship at Mellon Institute of Industrial Research, where basic studies are in continual progress on the storage of liquids and gases—particularly in pressure tanks, with insulation for hot or cold storage, and in the storage of corrosive liquids and liquids that turn to gases at atmospheric pressure. Answers to problems of design, the application of materials, or questions of procedures where information is not readily available, are developed from data of record or actual research and testing with the exceptional facilities provided.





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per prolonged absence was $342—52% for hospitals. Overall, 62% of gross medical care costs were paid by group plan benefits. Workers in the lowest pay bracket had to pay out an average of $86 to make up the difference; for those in the $10,000/year-and-up salary category, average net medical-care costs were $415 per absence. Group benefits met 80% of hospital charges, 61% of surgeons' fees, but only 16% of all other medical charges, including physicians' and nurses' fees.

Principal economic impact of prolonged-illness absence on the individual worker, Werch states, is loss of earnings for the period of absence. The gross wage loss represents 68% of the total cost of prolonged absence; but sickness compensation or sick-leave plans provided 55% of normal pay.

Research Need Cited: Werch doesn't go into detail on recommendations for industrial employers, but these suggestions can be deduced from his chapter on conclusions:

- Industrial firms should support research on prevention and cure of the ailments that are responsible for the bulk of prolonged-illness absenteeism.
- Companies should be on the alert for any factors in the plant or office that might tend to cause those ailments.
- Company medical departments should not be just "first-aid stations", but should be staffed and equipped to make early diagnoses, advise employees on obtaining proper medical care, and for consultation with attending physicians.
- Corporations should use data from this survey as a basis for new "manning plans" that will provide for re-assignment of qualified personnel to perform essential duties of absentees.
- Firms, too, should investigate possible need for new sickness-injury benefits programs, perhaps with greater compensation than most present plans provide for expenses other than hospital and surgical ones.

The study furnishes information that should be of use to chemical as well as other industrial employers. However, other less-detailed surveys by the U. S. Bureau of Labor Statistics and by the Chamber of Commerce of the U.S. (*table*) indicate that chemical employers already are above the industrial average in facing up to such situations.

'Good Faith' Defender

Industry's attack on pending legislation that would wipe-out a supplier's right to plead "good faith" to charges of illegal price discrimination (CW, March 23, p. 21) has been joined by the Drug, Chemical and Allied Trades Section of the New York Board of Trade.

Section Chairman J. David Hayden, of R. P. Scherer Corp. (Detroit), has written to members of the Senate's Antitrust and Monopoly Legislation Committee and a subcommittee of the House Judiciary Committee, charging that the bills in question—H.R. 11 and S. 11—would take away industry's protection in meeting competition and seriously interfere with normal business procedures.

"Many of our members," Hayden said, "are daily confronted with the business situation in which they must decide whether they will meet a competitor's price. If while making this decision they must, at the same time, determine whether their action, in meeting the lower price, will at some later date expose them to the risk of a treble damage action because it may be held to offend an amended Robinson-Patman Act, we submit that Congress will thereby be imposing an unfair and onerous burden on business."

IDEAS

In Place of a Gold Watch: Corn Products Refining Co. (New York) has a substitute for the traditional gold watch presented in recognition of 50 years of employment.

Each of two 50-year employees at the firm's Argo, Ill., plant recently received 30 shares of Corn Products stock valued at approximately $1,000. The employees, Edward Swanson and Joseph Kowal, are an assistant master mechanic and a packaging line operator, respectively.

•

Recruiter's Aid: Diamond Alkali Co. (Cleveland, O.) has joined the ranks of those chemical process companies placing increased emphasis on effective personnel recruitment. Latest Diamond Alkali step: publication of a 12-page booklet, "Successful College Recruiting This Year—1957," intended as a guide for recruiters, and covering such points as preparing, conducting and follow-ups of interviews.

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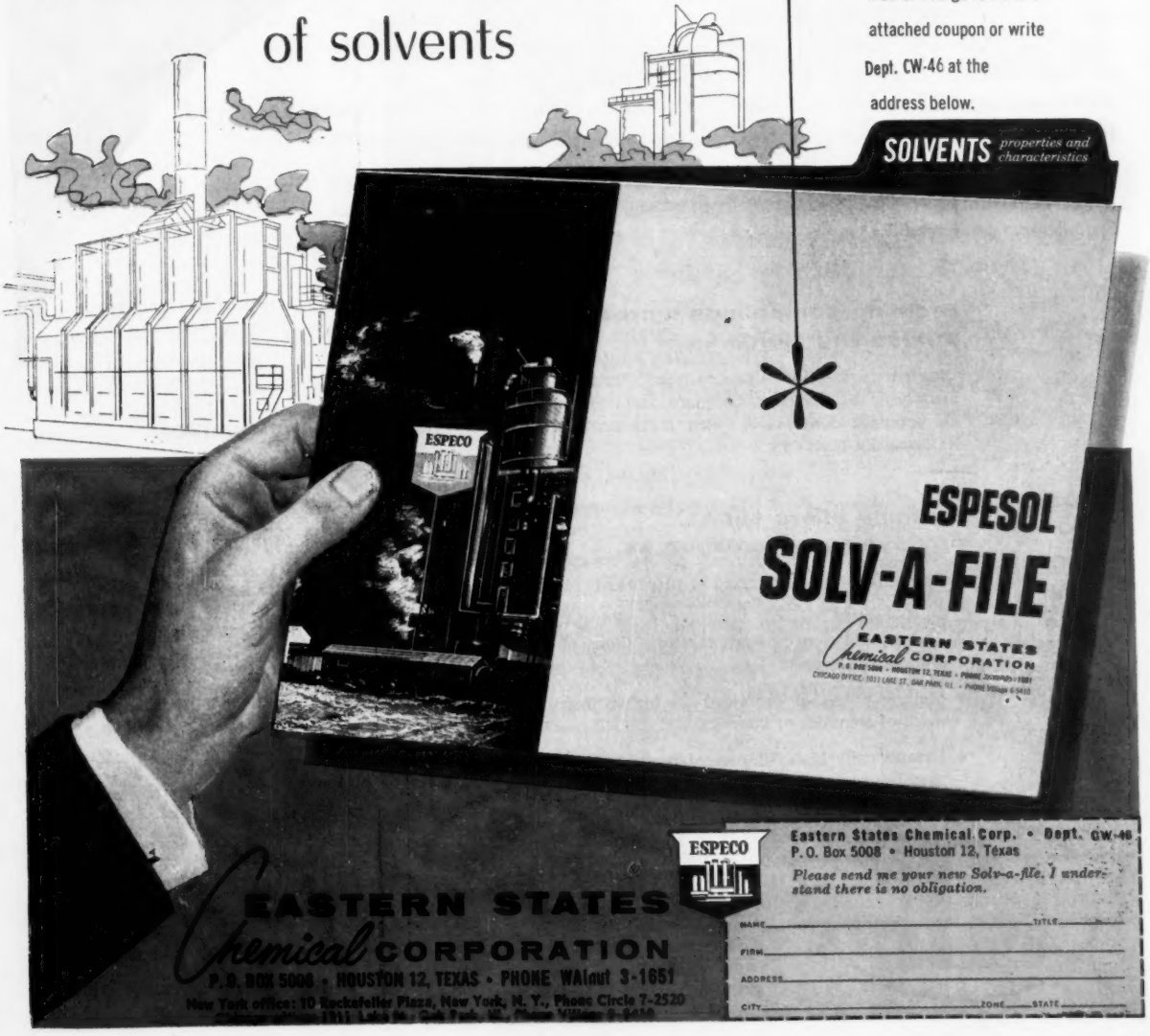

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- Exceptionally high densities of bromine compounds.
- Catalytic properties of various inorganic bromides in reactions involving intramolecular rearrangements.

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- New pharmaceuticals are possible with bromine compounds as intermediates.
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† A joint-venture project of Michigan Chemical Corporation and Murphy Corporation of El Dorado, Arkansas

WIDE WORLD

PREMIER DOUGLAS: His government's chemical plants hit by strike.

LABOR

Saskatchewan Sulfate Strikes: About 95 members of Oil, Chemical & Atomic Workers Union have walked off their jobs at two sodium sulfate plants owned and operated by the Saskatchewan provincial government—which at present is a socialist regime headed by Premier Thomas Douglas. The strikers are demanding a 20¢/hour increase in wage rates and an annual three-week vacation. Present basic rate is $1.34/-hour. One of the plants—at Chaplin, Sask.—is said to be the largest sodium sulfate plant in the world, valued at more than $10 million and producing annually about $5 million worth of salt cake. Output goes mostly to Kraft paper, soap and glass plants.

•

Company-wide Contracts: The inter-union soap council recently formed by the International Chemical Workers Union and the Oil, Chemical & Atomic Workers—both AFL-CIO—has negotiated a nation-wide agreement with Lever Brothers. One contract covers five Lever plants represented by ICWU locals; another pact applies to a plant at which OCAW is bargaining agent. Terms include a 5% wage increase averaging 11.1¢/hour, 8¢ and 14¢/-hour shift differentials, up from 6¢ and 12¢; and more liberal insurance and disability benefits.

•

Craft Severance Sustained: The National Labor Relations Board's present

ADMINISTRATION

policy permitting "craft" workers to split-off from plant-wide bargaining groups in large industrial plants has been upheld by a U.S. circuit court. In the case at issue, the International Brotherhood of Electrical Workers (AFL-CIO) won NLRB certification as bargaining agent for a craft group at a Libbey-Owens-Ford Glass Co. plant where the AFL-CIO Glass Workers had been representing all hourly-paid employees. The company declined to recognize IBEW, and NLRB issued a refusal-to-bargain charge. That charge was upheld last week by the U.S. Circuit Court of Appeals at Richmond, Va.

KEY CHANGES

Carl O. Hoyer, to vice-president, engineering; and **Jack W. Mueller,** to controller; Chemstrand Corp.

W. Benton Harrison, to board chairman; **Garth W. Edwards,** to controller; and **Howard M. Cohen,** to secretary; Sylvania-Corning Nuclear Corp. (Bayside, N.Y.).

Graham C. Mees, to president; and **John C. Hecker,** to vice-president and general manager; Distillation Products Industries, division of Eastman Kodak Co. (Rochester, N.Y.).

William P. Hettinger, Jr., to research director, Catalyst Division, National Aluminate Corp. (Chicago, Ill.).

Homer E. Kieweg, to manager, Technical Development Dept., Commercial Solvents Corp. (New York).

John T. Dillworth, to vice-president, Baird Chemical Corp. (New York).

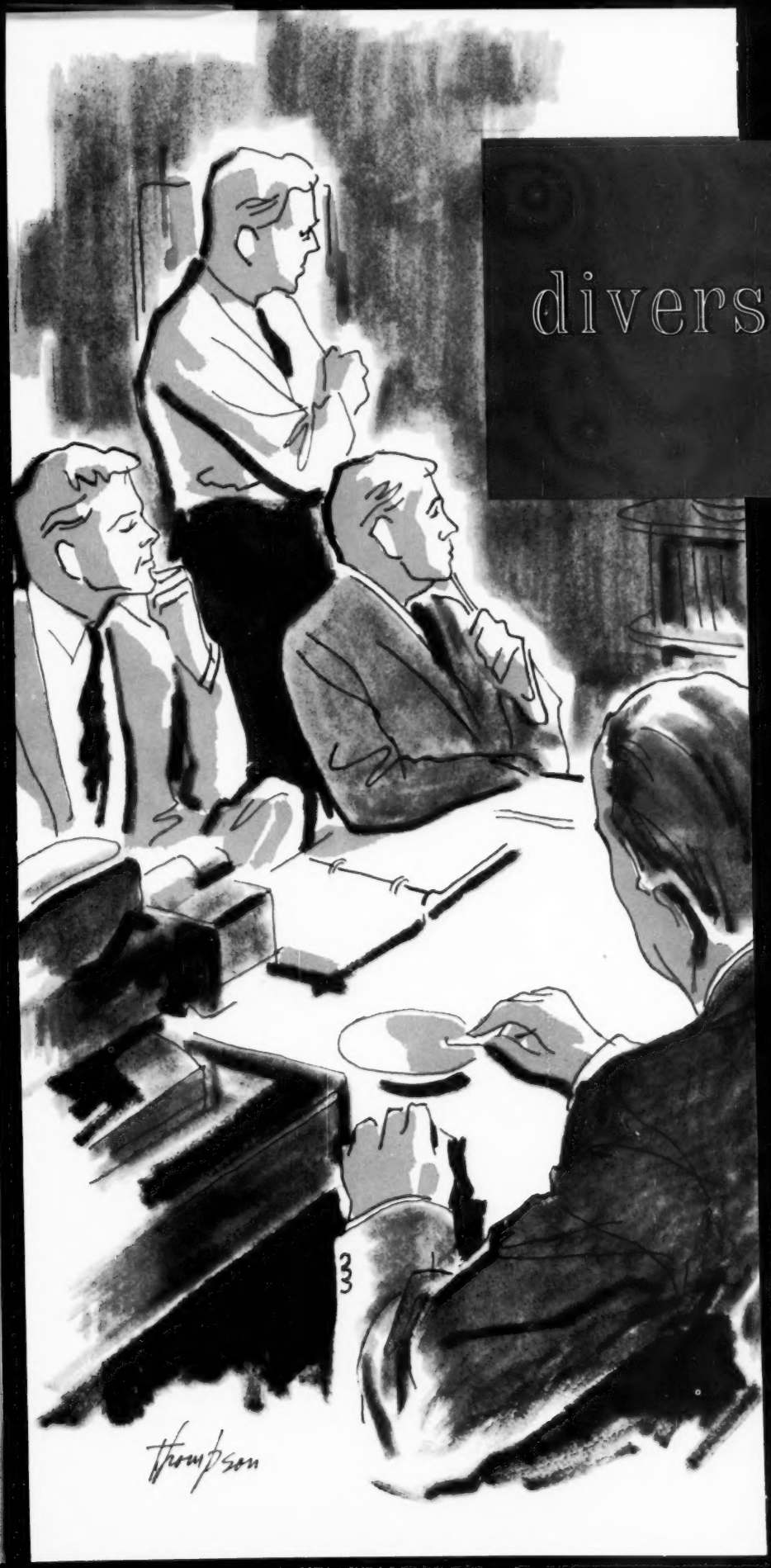
James J. Slattery, to sales manager, Newport Industries Co., a division of Heyden Newport Chemical Corp. (New York).

Julian A. Rogers, to manager, Manufacturing Dept., Polymer Chemicals Division, W. R. Grace & Co.

J. M. Cannon, to president and treasurer; **K. F. Neulinger,** to vice-president in charge of sales; and **Miss Y. Perlmutter,** to secretary; Croda Incorporated (New York).

RETIRED

Walter Dannenbaum, vice-president and member of the executive committee, E. I. du Pont de Nemours & Co.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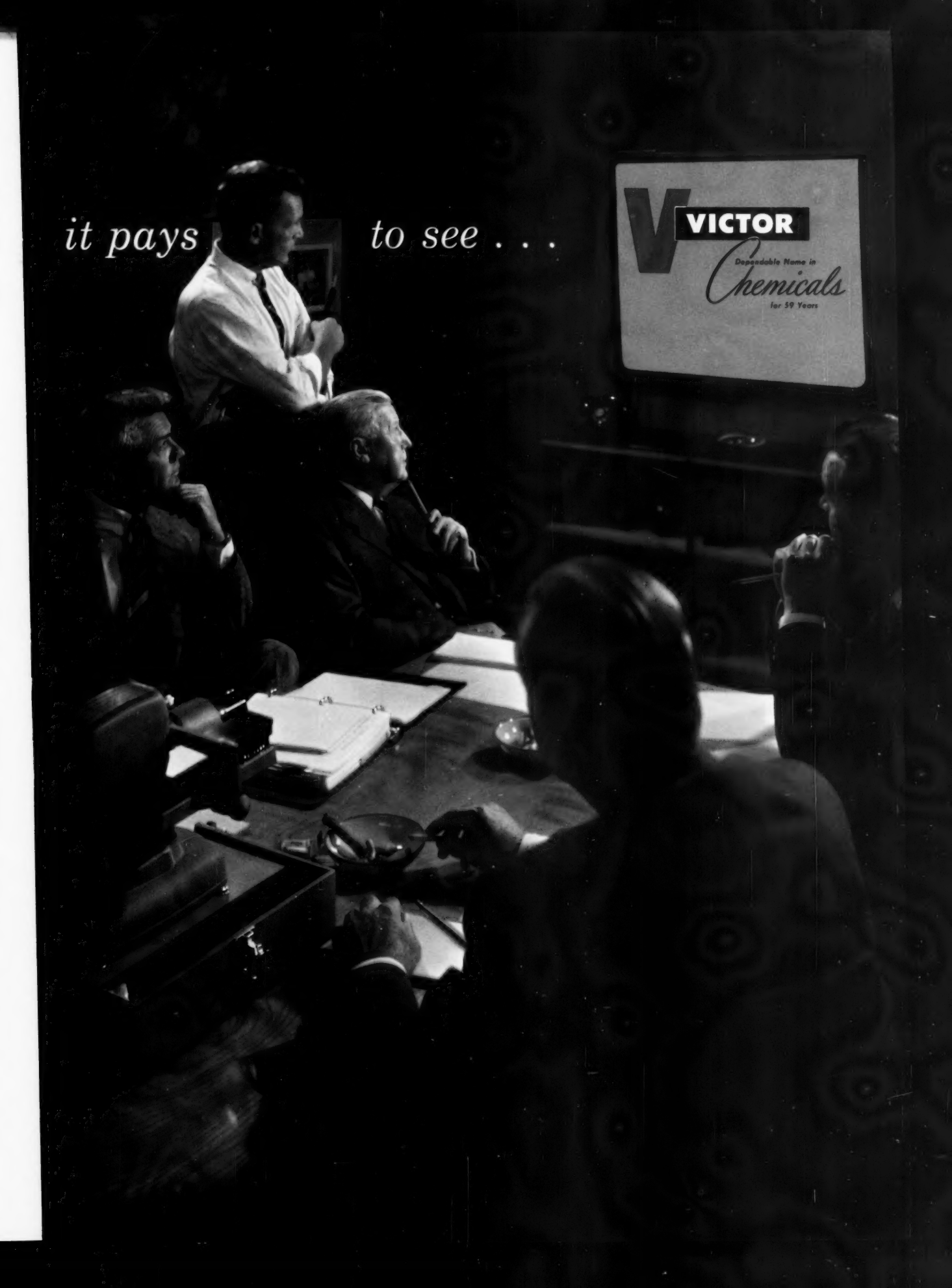
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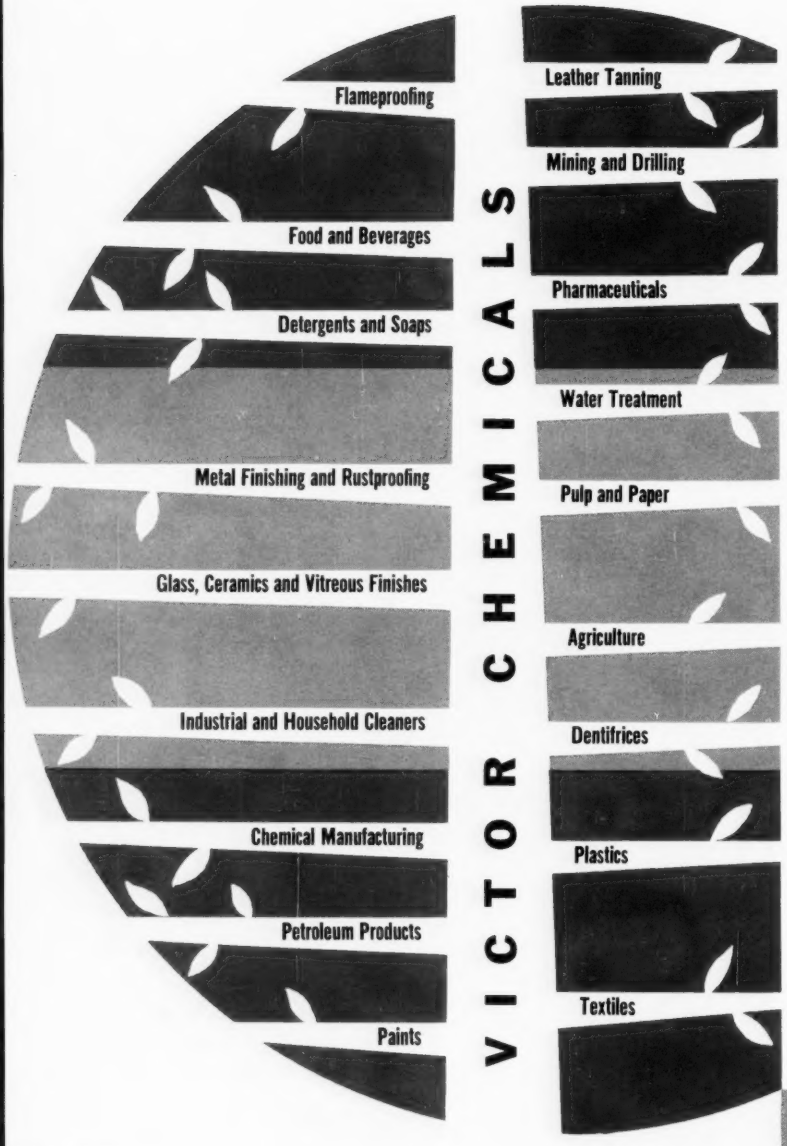

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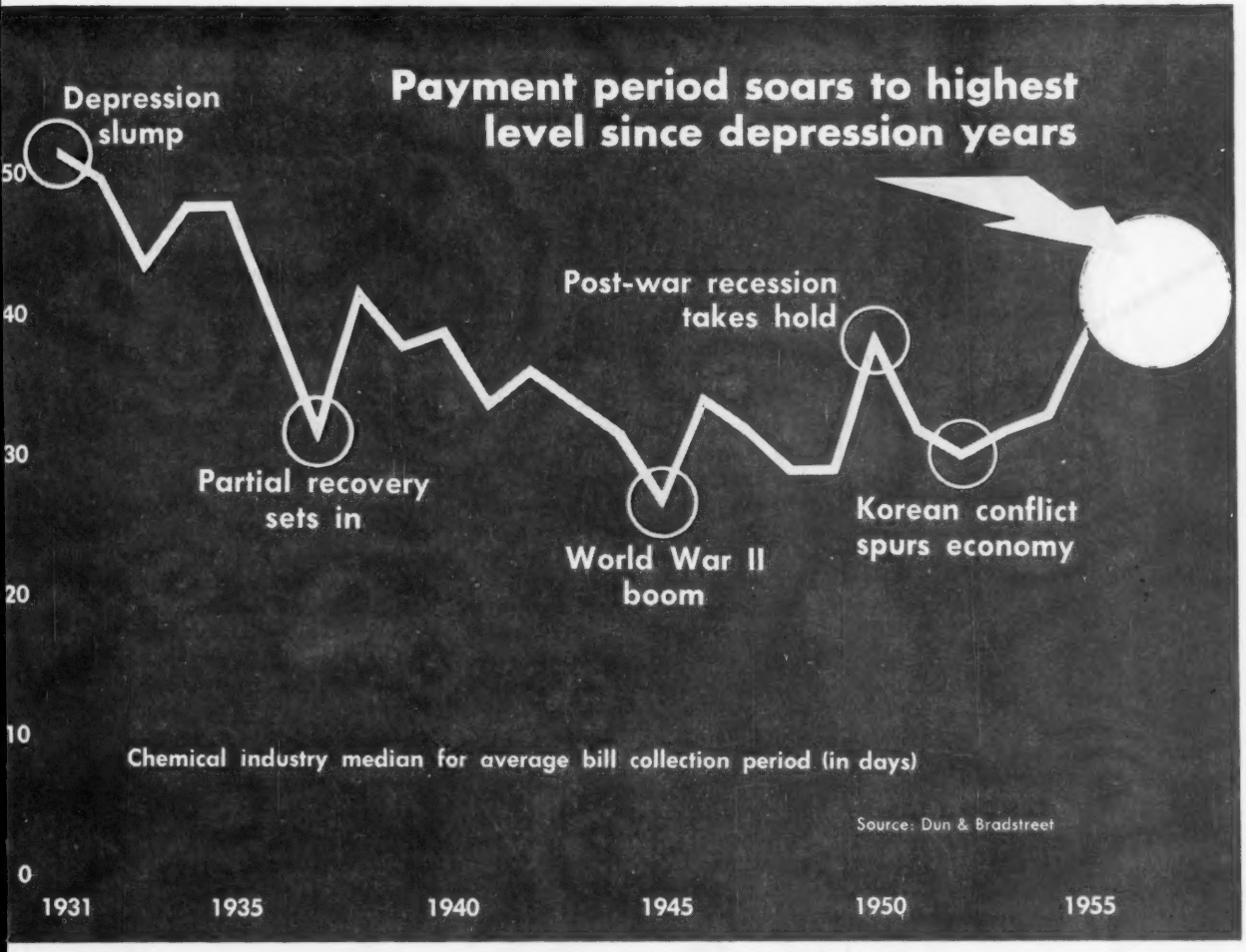


Slow Payments Threaten Future Sales

Credit troubles are building up to a worrisome level for many chemical companies. According to Dun & Bradstreet's latest data—for 1955—the average chemical industry collection period is 39 days, highest since the depression. And today, many credit managers are freely predicting a continued uptrend—perhaps to 41-43 days in 1957.

Further compounding the problem are revisions in corporate income tax payment schedules. Last year, 20% of the tax was due the year income was earned. This year, it will be 30%, and by 1959, 50% must be paid in the year of earning.

The situation is already forcing one big company to evaluate the probable impact on future business relations of 5% interest charges on past-due accounts. Another firm has begun such charges for one product. It's an example of how some credit executives are attempting to tighten policies in the case of mounting requests for extended terms.

Capital pinch: Chemical companies feel the pinch most acutely in their working-capital funds. Reduced working capital may mean that expansion must be delayed or money borrowed at interest rates.

A slowdown in payments is a first-class headache for sales departments. Just when a liberal credit policy would be an effective sales tool, sales groups are forced to adopt tougher credit lines.

Is the average collection period an economic indicator? Government economists say no, but chemical business circles are inclined to disagree. At the least, they insist, lagging collections indicate a business slowdown; at the worst, serious financial difficulties.

Fortunately, not every chemical company has a credit problem. In a cross-country check last week, *CW* found about as many companies without a collection slowdown as those that reported trouble. Generally, credit managers say that industrial chemical companies (particularly large and medium size firms) are paying promptly.

But most reporting that they are in good shape cite special reasons: conservative credit policy; slowdown was anticipated and corrective measures applied; most business is done with large, quick-paying accounts; use dis-

count-pricing for prompt payment. And many with a favorable over-all credit picture note difficulty in specific areas.

What's bad: Lagging most in payment of bills, say credit men, are foreign customers and the agricultural, plastics, and textile industries. And recently, some add, accounts tied to the building industry have begun to be tardy in paying. Distributor payments, too, are reported lagging noticeably, as are payments from small paint, coatings, and electroplating firms, leather trade, drug sundries, automotive specialties, and foundry and china accounts.

On the brighter side, petroleum companies, food processors, ethical drug makers, rubber, soap and detergent firms are paying promptly. But even the highly-capitalized, blue-chip accounts—which formerly paid bills well in advance—now are waiting until the due date, one credit man observes.

Geographically, the problem appears to affect the entire nation with the possible exception of one major area. Although some reports conflict, firms in the Midwest, on the whole, appear to be maintaining payments.

It's interesting, too, that only a few firms note significant increases in bad debt write-offs. But that could change if a "rolling readjustment" forces marginal customers to the wall.

Behind the lag: The dip in collections has many causes, often related to very specific conditions; slow payments for agricultural chemicals in the Southwest, for example, are commonly blamed on the drought. Generally, though, credit managers stress these reasons for the lag:

- Competition. On the supplier level, intensive competition has led to liberal credit policies as one way to secure more business. Marginal customers—often ignored in times of short supply—are sought after to keep production at high rates. On the customer level, the plastics molder or ag chem dealer faces equally severe pressure, often must cut prices and wait for payment. He, in turn, makes his supplier wait.
- Inexperience. The small businessman—particularly the plastics molder—is often a newcomer. Hence, he is prone to overexpand, use poor pricing and inventory policies, be reluctant to ask his customers for payment. Result: lack of working capital, lagging payments to suppliers.
- Income tax. New schedules demand a larger portion be paid the year income is earned.
- Tight money. Recent restrictive federal credit policies have made bank loans harder and more expensive to get—especially for small firms or those in a depressed industry. Thus, the sup-

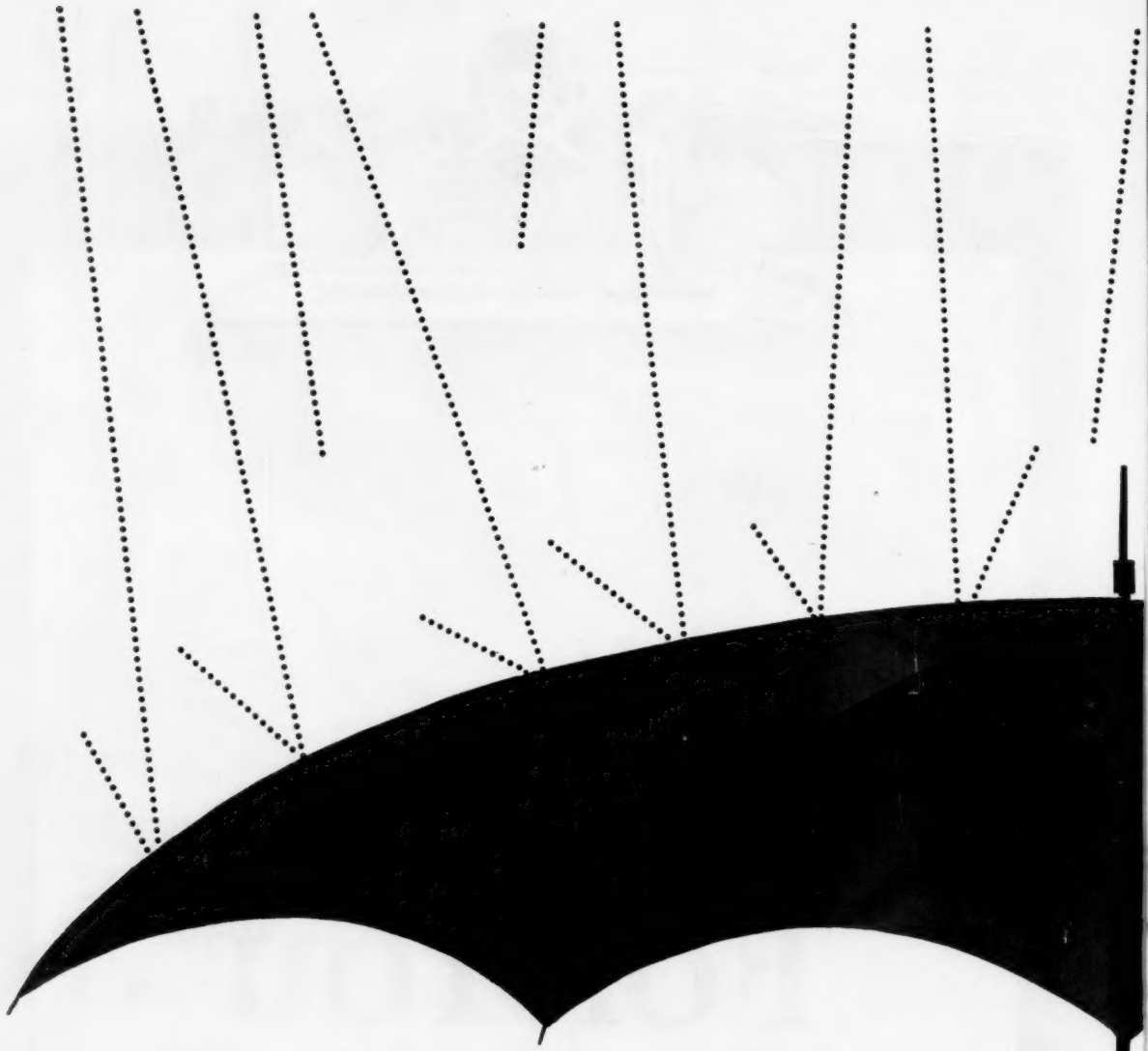
Four Ways to Speed Collections

CHARGE INTEREST on overdue accounts. The technique works if the interest is high enough and competitors go along. But it's risky; business may go to non-interest-charging suppliers.

GIVE DISCOUNT for payment within a stated period. Excellent in theory, this method is expensive and hard to enforce. Accounts pay late, still claim discount.

DROP SLOW PAYERS and restrict credit extensions. This is often a workable approach, but it has flaws: the jettisoned business will probably get credit elsewhere and it's difficult to resume sales relations at a later date. And, the policy pares sales at a time when they're needed most.

KEEP PRESSURE ON POOR PAYERS by personal visits, letters, other reminders. This method is less forceful, of course, but is probably the one least likely to hurt sales. It's effective, too, if enough effort is expended, but it's expensive.



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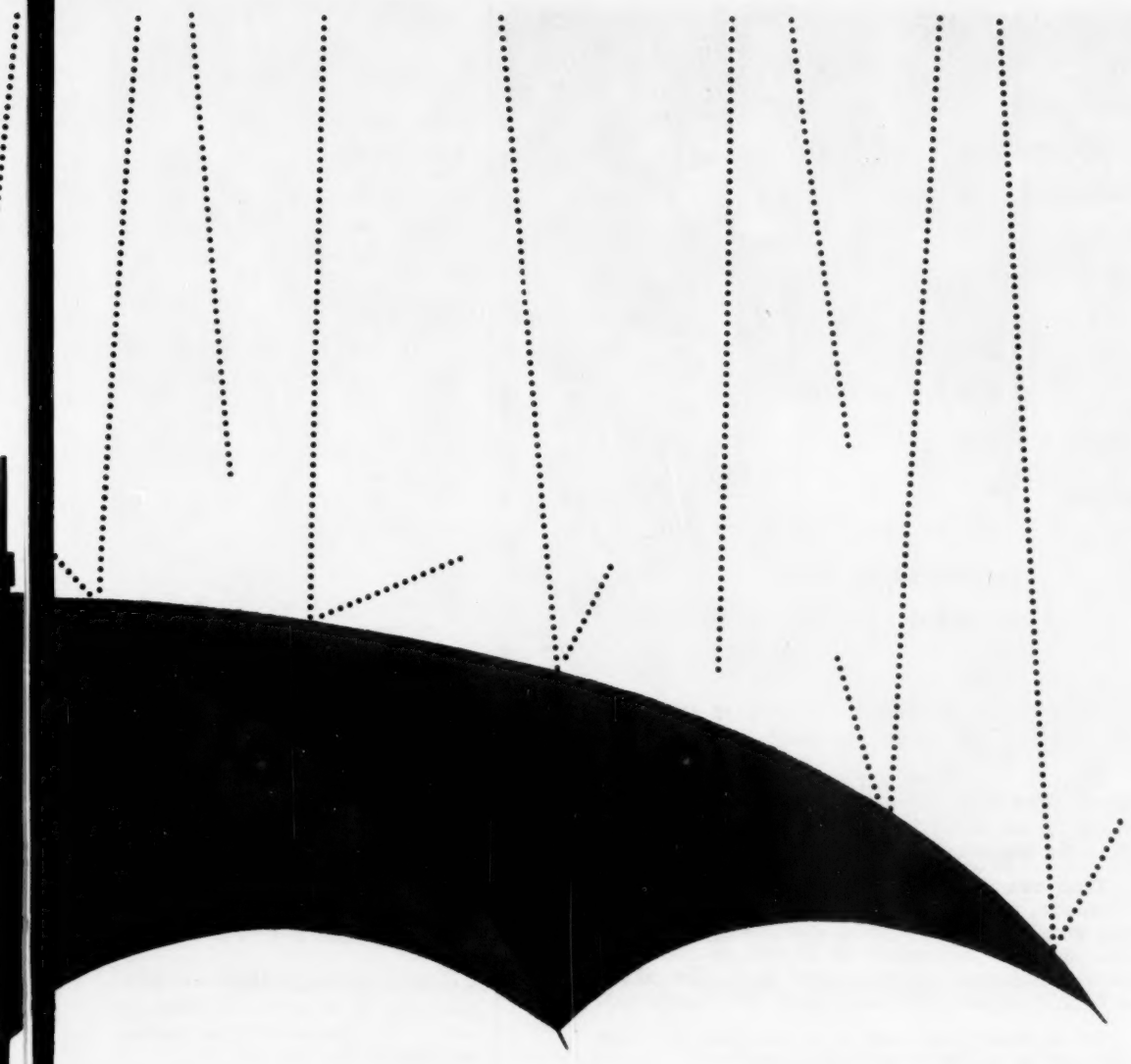

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plier assumes the banking role. Last year, unincorporated business could borrow only $500 million from banks, as compared to $4 billion in 1955.

Curiously, there's a strong minority of credit managers who doubt the influence of tight money on slow payments. Their accounts, they say, "have the money or can get it. But it's cheaper to use the supplier instead of the bank."

• Other reasons cited include payment disruption in the process of office mechanization, proximal (all bills from one supplier paid periodically) payment, cycle billing, and government regulations.

What to do? Several methods are available for speeding payments (*see p. 76*). All, however, have serious limitations. It's extremely unlikely that many firms will adopt interest-charging or discount* practices.

Some, for certain, will pare marginal accounts and contract the amount of credit extended. Others will launch more intensive followups. Credit education for customers might prove a big help. Already some companies have been advising customers on the techniques of collecting and credit management.

At the very least, suggests one company controller, it is time for chemical management to ask itself these questions:

• Does our credit department have the authority to set credit policy, as well as the responsibility for making collections?

• Is there a "no man's land" between our sales staff and credit organization?

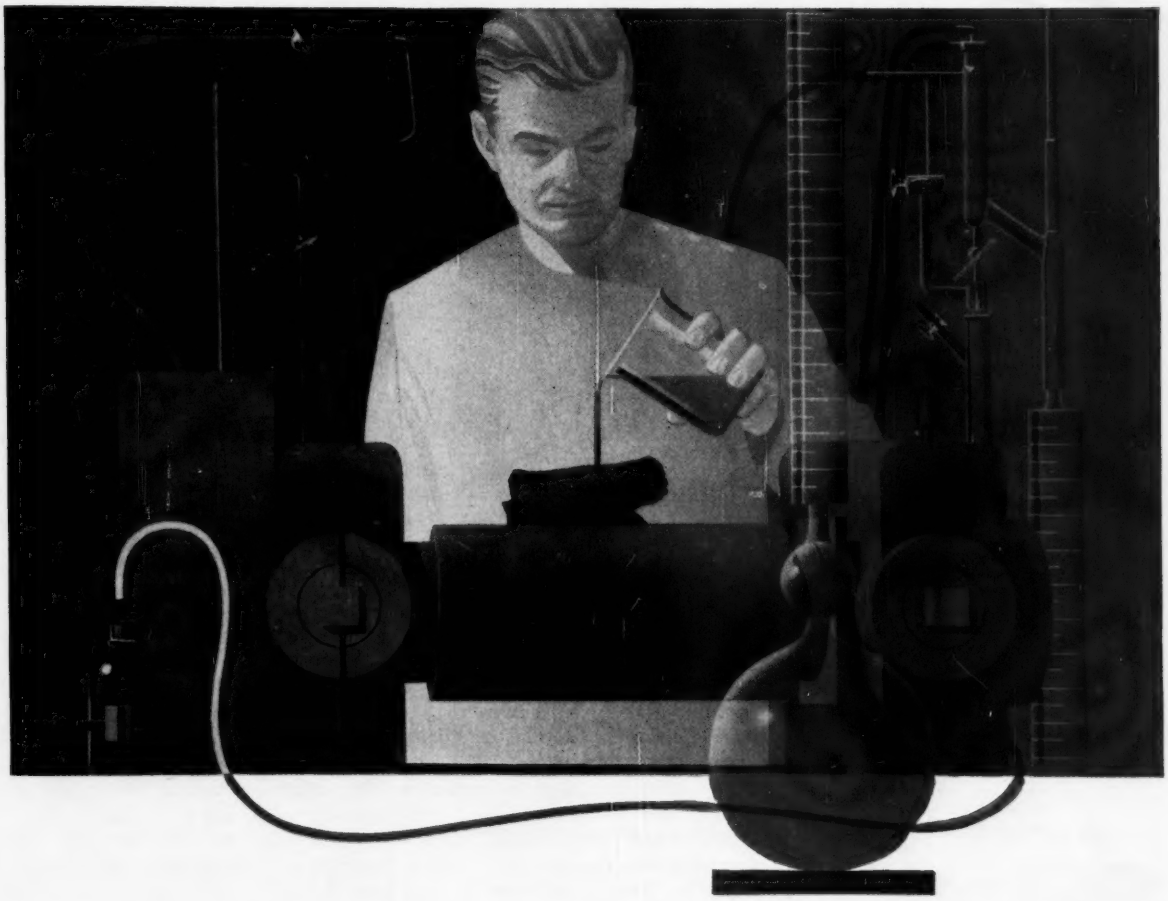
• Are we accepting too loosely the concept that unless we have reasonable credit losses, our policy fails to recognize sales-staff requirements?

• If present efforts are not effective enough, how can they be implemented, simplified or changed to make them more effective?

• What are our particular problems? Isn't good administration of current rules the answer to most of them?

How well such policies will work remains to be seen. There's many a credit manager who expects the economy to be decisive. A slump will further lengthen the payment period; a boom will shorten collection time.

*Discounts for prompt payments are given in only a few areas. Most common terms: net 30 days.



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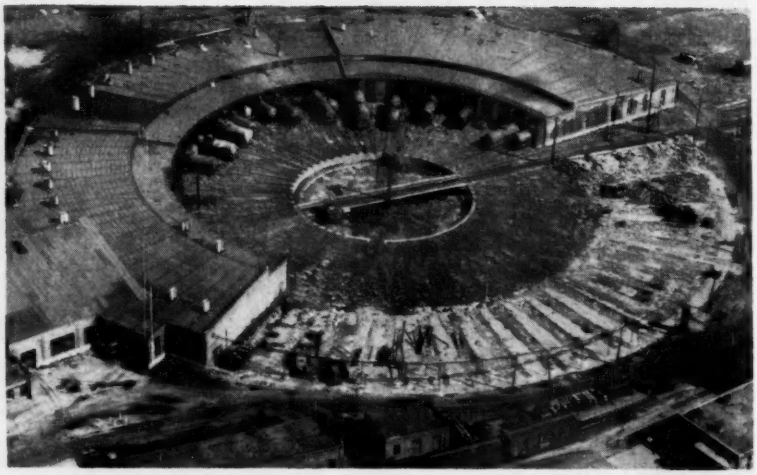

RAILROAD ROUNDHOUSE: Coating firm's way to lick two problems.

More Room in a Roundhouse

An abandoned railroad roundhouse is Lithcote Corp.'s answer to the dual problem of securing additional storage space and work area. The company—which specializes in protective coatings and linings for railroad tankcars, also does custom coating work—was faced with the necessity of speeding-up services and deliveries to keep pace with business.

When the Chicago and North Western Railway announced that it was about to lease its Chicago roundhouse (*above*), Lithcote was quick to see the possibility of adapting the structure to its needs. Since it moved from its previous location, Lithcote's business has increased 50%.

Old vs. New: The old plant contained a single set of tracks; the building could house only five tankcars at a time; could service an average of only 15 cars per month. The best single month during the twelve years that Lithcote occupied the old site saw an output of 30 serviced tankcars.

The roundhouse plant, which has twice as much working area, boasts 17 sets of tracks, can house 30 cars at a time. Average number of completed cars per month is between 30 and 35—and that's without overtime. Last October, the plant set an all-time record, applied protective coatings to 65 tankcars.

Although the roundhouse offered a good setup from the start, some changes were necessary. Open pits in the working area, for instance, had to be floored-over. A natural gas system was installed, as well as a central exhaust system for the spraying process. And space had to be converted for offices, a central laboratory, a mixing room, and a blasting area.

Last year, the first full year of operation at the Chicago roundhouse, the firm recorded a 20%-increase in business volume. Compared to '52, the last year operations were carried out completely at the old plant, the gain was 50%. Business from railroad tankcars alone soared 200% between '52 and '56.

Lithcote now has a capacity of 90 treated tankcars per month. Spokesmen for the firm are certain that this year will easily top '56's output.

COMPETITION

- Canadian Resins and Chemicals Ltd. has signed a sales agreement with the General Foam Corp. (New York), agents for vinyl foam products of Bolta Products (Lawrence, Mass.), to be the exclusive marketer of Bolta's vinyl foam in Canada.
- Union Carbide and Carbon Corp. has acquired a 90-acre warehouse site on the Calumet Sag channel at Chicago. The proposed structure will have between 200-300,000 sq. ft. of floor space, will handle products of many company divisions.
- Minerals & Chemicals Corp. (Menlo Park, N.J.) has granted the A. E. Fleming Co. (Detroit) an exclu-

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A large manufacturer of organic chemicals had used low tube side velocities to prolong the life of carbon steel heat exchangers used in a corrosive monoethanolamine service. This failing, the original units were replaced with "Karbate" shell and tube heat exchangers. After 2 years service, the "Karbate" exchangers showed no effects from exposure to the carbon dioxide-rich monoethanolamine solutions. Even more significantly, the "Karbate" impervious graphite units provide the required heat exchange with less than ⅔ the effective area of the carbon steel units. For full information on "Karbate" heat exchangers request **Catalog Section S-6740.**

New "National" High-Temperature Cement

"National" Cement Grade C-6, a new product developed by National Carbon Company, now makes it possible to fabricate large and relatively complex carbon and graphite structures for high temperature service.

The cement is easily prepared for use by mixing the powder and liquid ingredients shipped in a unit package. Pot life is exceptionally long. After the carbon or graphite parts are cemented together, the cement is cured for a brief period at low temperature. The fabricated structure may then be operated at temperatures as high as 3600°F. with assurance that the cement bond will remain as strong and chemically resistant as the carbon or graphite parts of the structure.

"KARBATE" Impervious Graphite Entrainment Separators Feature Corrosion Resistance, Simplicity, High Efficiency

"Karbate" Impervious Graphite Entrainment Separators — Type MV, now stocked in low cost standard units, are an efficient, economical means for removing entrained liquids from gas streams. These units operate through a combination of venturi action and impingement. Staggered rows of specially shaped vertical impervious graphite rods are contained within an impervious graphite body. Separated liquid collects at the bottom of the rods and is removed through an impervious graphite drain connection.

Type MV Entrainment Separators contain no moving parts and are nonclogging. Streamlined rod shape retards re-entrainment and offers minimum resistance to gas flow. Because corrosive liquid and gas contact only "Karbate" Impervious Graphite, units are virtually immune to corrosion over a temperature range from −40°F. to 338°F.

Standard sizes of "Karbate" Entrainment Separators — Type MV assemble directly into 6″, 8″, 12″, 16″, 20″ and 24″ horizontal lines. Units are self-contained and ready to install. For complete information, request **Catalog Section S-6900.**

"Karbate" Entrainment Separator Type MV ready for installation. Self-contained and shipped ready for use, unit mounts with axis horizontal between standard flanges. Unique design provides effective separation over a wide range of gas flow rates, entrainment content and liquid droplet particle size.

"KARBATE" pumps available in wide capacity range

Standard "Karbate" impervious graphite pumps listed below are carried in stock for prompt shipment. These pumps are used for transfer and circulating service involving corrosives, and deliver 5 to 1500 gallons/minute at heads up to 120 feet and operating pressures up to 100 lbs./square inch. For full information, request **Catalog Section S-7250.**

Pump size			Motor-Mounted	Frame-Mounted
Suction		Discharge	Type F	Type C
2	x	1½	29-FAL	1½-CB
3	x	2	19-FAL	2-CA 2-CB
4	x	3	—	3-CA 3-CB
6	x	4	—	4-CA

SALES

sive sales territory—Michigan, northwestern Ohio and northeastern Indiana—for its aluminate silicate pigments and Attapulgites.

DATA DIGEST

• **Polyvinyl latices:** 8-p. bulletin describes the physical properties of Geon 450X3, an internally plasticized latex. Applications are suggested in masonry finishes and exterior wood paints. B. F. Goodrich Chemical Co. (Cleveland).

• **Glycol solutions:** New bulletin covers the use of Arochem 401 and 404 in steam-set printing inks. Properties of the products and suggested ink formulations are included. Archer-Daniels-Midland Co. (Minneapolis).

• **Silicones:** Folder presents information on the use of silicones as water repellents for masonry. It covers benefits, application, specifications, safety precautions and other topics. Silicone Products Dept., General Electric (Waterford, N.Y.).

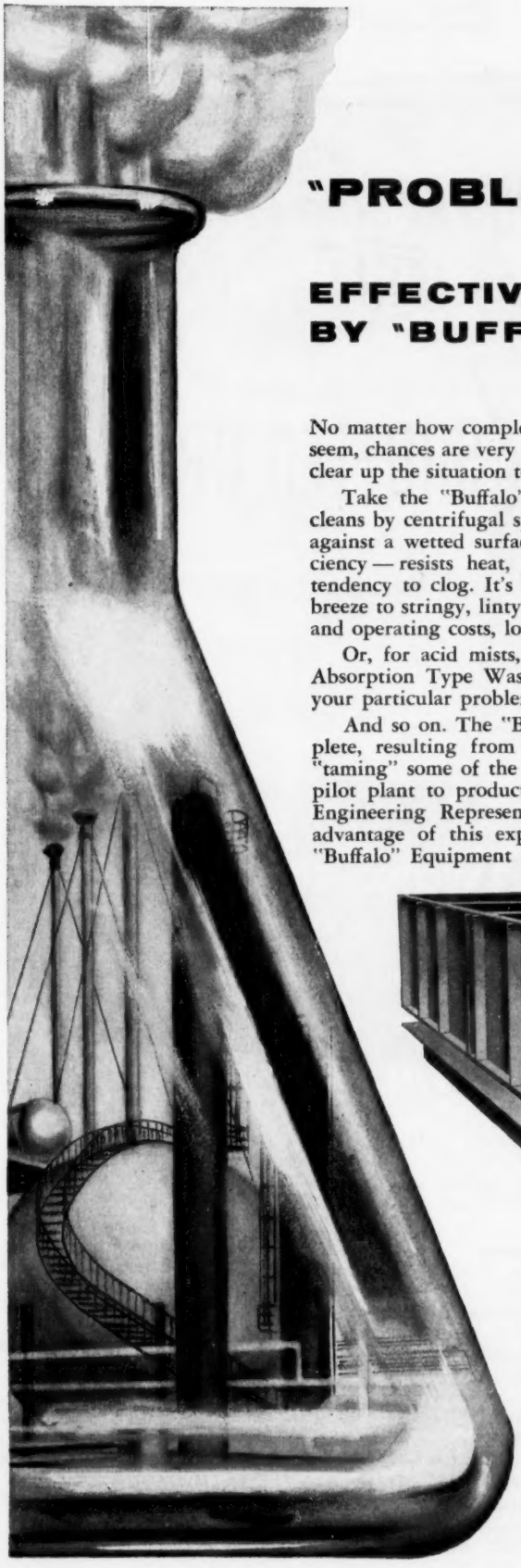
• **Protective coatings:** Brochure describes various types of linings and coatings, application, suitability of coatings for specific uses, and specifications of some materials. Metalweld, Inc., Protective Coatings Div., (Philadelphia).

• **Polyethylene colors:** 6-p. bulletin gives information on granular concentrates for coloring polyethylene, treats such topics as heat and light stability, migration and chemical resistance. Claremont Pigment Dispersion Corp. (Roslyn Heights, L.I.).

• **Insecticides:** Brochure contains technical bulletins describing use of chlordane insecticides in municipal insect control. Covered: insect habits, insecticide dosage and specifications. Velsicol Chemical Corp. (Chicago).

• **Forest products:** Publication gives abstracts of papers appearing in the last six months of 1956 on the chemistry of wood and derived products, glues, veneers, plywood, mechanical properties of wood and paper, packaging, protective coatings, plastic laminates, pulp and paper processing and several other topics. Forest Products Laboratory, U.S. Dept. of Agriculture, (Madison, Wis.).

• **Trade shows:** Annual publication lists shows and exhibits for 1957 by industry, chronological occurrence and by geographical location. Exhibitors Advisory Council, Inc. (New York).



"PROBLEM" EFFLUENTS . . .

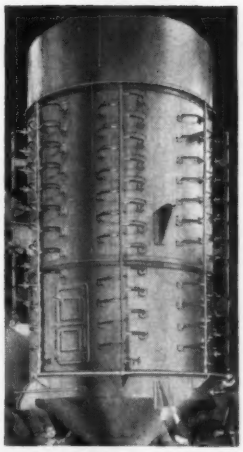
EFFECTIVELY CONTROLLED BY "BUFFALO" EQUIPMENT

No matter how complex your air cleaning problem may seem, chances are very good that some "Buffalo" unit can clear up the situation to your complete satisfaction.

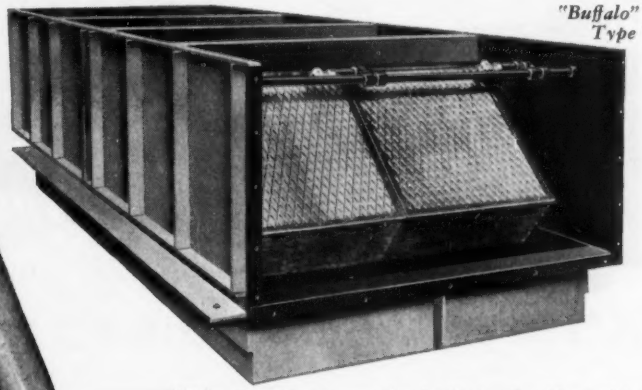
Take the "Buffalo" Hydraulic Scrubbing Tower. It cleans by centrifugal spray action, plus scrubbing action against a wetted surface — provides high collection efficiency — resists heat, corrosion and abrasion — has no tendency to clog. It's controlling everything from coke breeze to stringy, linty discharges. Maintenance is simple and operating costs, low.

Or, for acid mists, fumes and vapors, the "Buffalo" Absorption Type Washer may be the best solution for your particular problem.

And so on. The "Buffalo" line of equipment is complete, resulting from a half-century of experience in "taming" some of the toughest industrial effluents, from pilot plant to production. Write or phone the Buffalo Engineering Representative in your territory, to take advantage of this experience and the "Q" Factor* in "Buffalo" Equipment for the results you want!



"Buffalo" Hydraulic Scrubbing Tower



"Buffalo" Absorption Type Washer

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

"Buffalo"

BUFFALO FORGE COMPANY

BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING EXHAUSTING AIR CLEANING FORCED DRAFT AIR TEMPERING COOLING HEATING INDUCED DRAFT PRESSURE BLOWING

WHEREVER YOU ARE . . .

THERE'S A DISTRIBUTOR

OF DU PONT UREA

READY TO SERVE YOU

ALABAMA

Birmingham.....F. H. Ross & Co.
Mobile.....F. H. Ross & Co.

CALIFORNIA

Los Angeles.....Braun Corporation
San Francisco.....Braun-Knecht-Heimann Co.

CONNECTICUT

South Norwalk
Merchants Chemical Company, Inc.

FLORIDA

Jacksonville.....F. H. Ross & Co.

GEORGIA

Atlanta.....F. H. Ross & Co.
Columbus.....F. H. Ross & Co.
Savannah.....F. H. Ross & Co.

ILLINOIS

Chicago.....Central Solvents & Chemicals Co.

KENTUCKY

Louisville.....Merchants Chemical Co., Inc.

MARYLAND

Baltimore.....Leidy Chemicals Corp.

MASSACHUSETTS

Fall River.....Borden & Remington Co.
Stoneham.....George Mann & Co., Inc.
Worcester.....Chemical Sales & Service Co., Inc.

MICHIGAN

Detroit.....Eaton Chemical & Dyestuff Co.

MINNESOTA

Minneapolis.....Merchants Chemical Co., Inc.

MISSISSIPPI

Jackson.....F. H. Ross & Co.

Du Pont chemical experience is the reason...

You can count on Du Pont Crystal and Shotted Urea for highest purity

A product of continued research and development —Du Pont Urea is conveniently supplied through a nation-wide network of distributors.

Du Pont Urea is proven for highest quality and consistent uniformity wherever it's used. Many processors prefer the more pure, time-proven crystal form; others find the newer, free-flowing "shotted" urea better suited to their needs for simplified storage and faster production. Both forms of Du Pont Urea are equally dependable in performance . . . both are readily available from your local distributor.

Du Pont Urea effectively serves in a wide number of chemical applications. For example . . . its reactivity with aldehydes makes Du Pont Urea extremely valuable in the manufacture of urea-formaldehyde thermosetting resins for adhesives, protective finishes and molding compositions. It is also used extensively in the treatment of paper and textiles.

If your production or development work requires high quality and performance of urea, why not take advantage of over 20 years of research experience responsible for the exacting manufacture of Du Pont Urea? Your local distributor can provide immediate shipment of both Crystal and Shotted Urea in 100-lb. multi-ply paper bags. And remember, too, a Du Pont Technical Representative is always available for assistance when you deal with any of the distributors listed below.

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

FORMULA: $CO(NH_2)_2$

Typical Analysis for Crystal Urea:

pH (10% solution at 20° C.)	8.3
Moisture	0.25%
Ash	11 ppm
Free Ammonia	4 ppm
Iron	0.4 ppm
Color, APHA (10 gm. in 100 ml. methanol)	2
Turbidity, APHA (50 gm. in 100 ml. water at 25° C.)	5 ppm

Typical Analysis for "Shotted" Urea:

pH (10% solution at 20° C.)	9.4
Moisture	0.17%
Ash	35 ppm
Free Ammonia	150 ppm
Iron	0.9 ppm
Color, APHA (10 gm. in 100 ml. methanol)	2
Turbidity, APHA (50 gm. in 100 ml. water at 40° C.)	7 ppm

POLYCHEMICALS DEPARTMENT

MISSOURI
Kansas City.....Barada & Page, Inc.
St. Louis.....Barada & Page, Inc.
St. Louis.....Missouri Solvents & Chemicals Co.

NEW JERSEY
Newark.....National Oil & Supply Co.
Paterson.....Brown Chemical Co., Inc.

NEW YORK
Buffalo.....Chemical Sales Corp.
Hicksville, Long Island.....National Oil and Supply Co.
New York.....Merchants Chemical Co., Inc.

NORTH CAROLINA
Charlotte.....F. H. Ross & Co.
Greensboro.....F. H. Ross & Co.
Raleigh.....F. H. Ross & Co.

OHIO
Cincinnati.....Merchants Chemical Co., Inc.
Cleveland.....Ohio Solvents & Chemicals Co.
Columbus.....Merchants Chemical Co., Inc.

OREGON
Portland.....Van Waters & Rogers, Inc.

PENNSYLVANIA
Altoona.....Western Penna. Chemical Co., Inc.
Erie.....Western Penna. Chemical Co., Inc.
Middletown (Harrisburg).....Western Penna. Chemical Co., Inc.
Philadelphia.....Pioneer Salt Co.

RHODE ISLAND
Providence.....Borden & Remington Co.
Providence.....George Mann & Co., Inc.

SOUTH CAROLINA
Columbia.....F. H. Ross & Co.
Greenville.....F. H. Ross & Co.

TENNESSEE
Chattanooga.....Burkart-Schier Chemical Co.
Knoxville.....Burkart-Schier Chemical Co.
Knoxville.....F. H. Ross & Co.
Nashville.....Burkart-Schier Chemical Co.

TEXAS
Dallas.....Van Waters & Rogers, Inc.
Houston.....Van Waters & Rogers, Inc.

UTAH
Salt Lake City.....Braun-Knecht-Heimann Co.

WASHINGTON
Seattle.....Van Waters & Rogers, Inc.

WISCONSIN
Milwaukee.....Merchants Chemical Co., Inc.

All steelwork, as well as the concrete silos, of this Midwest plant is protected with Parlon weatherproof paint. Silos were then given a Parlon-aluminum topcoat to reflect sun's rays, to keep silo interiors cool, and to help prevent spontaneous combustion of fermenting silage.

SPARKLES IN THE SUN... SHEDS WATER LIKE A DUCK

... because it's protected with Parlon®

In the Farm Belt of Indiana these towers stand out like a beacon. Their striking sparkle is due to a Parlon-fortified coating combined with aluminum paste.

"But," reports Mr. Walter Brassert, President, Concrete Silo Company, Bloomfield, Indiana, "appearance was only one of the requirements. We needed a finish to withstand the extremely active effect of silage on paint films. And the coating sheds water like a duck when we have driving rains. Our Parlon formulation makes a wonderfully lasting coat of paint."

Such testimonials are not unusual for Parlon-based formulations. Whether you need a finish to withstand the corrosive attack of acid, alkali or water; whether you need to protect metal, concrete or wood—you'll find a Parlon formulation ideal for your specific requirements. Paints containing Parlon chlorinated rubber are available from 400 manufacturers under their own brand names. Or, for more information, write:

Cellulose Products Department

HERCULES POWDER COMPANY

INCORPORATED

992 Market Street, Wilmington 99, Delaware

CR57-3

Better Times Ahead?

That hard-pressed fertilizer distributor, Chemical Enterprises, appears on the threshold of better times. After undergoing severe losses and a management shakeup (*CW, Feb. 25, '56*), the company has just reported to stockholders at its annual meeting that for the last six months of '56, losses were only $30,000.

More important to Chemical Enterprises' prospects, however, is it's new contract with Dow Chemical, approved at the same meeting. The debt of some $1.75 million, owed by CE to Dow for some time, will be treated as a long-term loan to CE. Additionally, CE has contracted to buy ammonia from Dow for a five year period, with an option for another five years. Dow cannot call for repayment of the loan until 12 months after the expiration of this sales contract.

Dow, in return, has acquired an option to buy 49% of Chemical Enterprises stock. It would pay the market price current at the time this option is exercised—which is allowed during the existence of its ammonia purchase contract. (Under certain conditions, CE could buy back this 49% interest.)

Expansion for Enterprises: After contracting its business activities for a period of several years, CE now seems expansion-minded. It's adding pesticides and other agricultural chemicals to its line of fertilizers, is moving into the distribution of industrial chemicals. And it's acquired a new distribution outlet in the Southwest.

Company executives are satisfied with CE's present financial condition. They claim that the ratio of assets to liabilities is now good, that working capital exists, and that there's no need for further credit. The firm has an improved chance of showing profits within a few years, possibly even in 1957.

One trouble spot, however, was probed at the meeting. Commercial Solvents Corp. has started a million-dollar arbitration proceeding against CE. The dispute involves contracts signed with a defunct CE subsidiary in Louisiana. Although officials of Chemical Enterprises discounted the significance of CSC's action, they quickly moved to adjourn the meeting, block stockholder questioning.

That, though, appears to be the only dark spot in CE's brightening future, other than competition.

PERMOBOND

...“the best tank lining we’ve ever had”

SAYS THIS LARGE ACID-CARRYING FLEET OWNER

One of the largest fleets of acid-carrying trucks in the East is P. B. Mutrie Motor Trans., Inc., owner of about 50 acid tankers. The truck above is one of their newest, and is the largest *rubber-lined* tank truck in New England, and one of the largest in the country. Like the other dozens of Mutrie’s tanks, this one is lined with PERMOBOND,® the rubber lining that is resistant to corrosion, and that prevents iron rust from contaminating the chemical in the tank. This truck also carries a U. S. Rubber Acid Discharge Hose, engineered to fit particular corrosion conditions.

Any container of corrosive acids, no matter how complex its shape, can be lined with PERMOBOND—whether it is original equipment or existing equipment—whether it’s over-the-road tank trucks or railroad tank cars.

So, for any rubber lining requirement, contact tank lining experts at U. S. Rubber, Mechanical Goods Division, Rockefeller Center, New York 20, N. Y.

In Canada, Dominion Rubber Co. Ltd.

Mechanical Goods Division

United States Rubber

Technology
Newsletter

CHEMICAL WEEK
April 6, 1957

An unusual styrene plant slipped onstream early in February, is being dedicated this week. It's Cosden's $3-million, 20-million-lbs./year unit, built by Badger Mfg. Co.

The plant's novel twist: it extracts ethylbenzene from the C-8 stream. Other firms make ethylbenzene from ethylene and benzene. By extracting it from its regular plant stream, Cosden has been able to get by with a small investment—$300/ton of annual capacity *(CW, Technology Newsletter, March 3, '56).*

Located in Big Spring, Tex., the plant utilizes four fractionating columns, each about 200 ft. tall. Three in series provide the equivalent of 350 theoretical plates for the ethylbenzene distillation.

•

Another plant startup—in France—should have significance for U.S. chemical producers: Houilieres du Bassin de Lorraine is operating at its Carling plant a catalytic hydrogenation process for refining benzene.

The French plant can treat over 70,000 tons/year of benzene, or over half the total consumption in that country. It is designed to utilize either straight hydrogen or hydrogen in coke-oven gas.

The plant at Carling is said to be the first one of its kind built outside of Germany. But it won't be long before U.S. companies have similar plants in operation (*CW, Sept. 8, p. 115*).

Houilieres du Bassin de Lorraine will use refined benzene from the process to make ethylbenzene for a styrene plant now abuilding at the same site. Ethylene will come from the firm's coke-oven-gas ammonia project.

•

Look for lithium to get a tryout as a heat transfer medium in nuclear reactors to power missiles. It is getting close scrutiny for such a system right now. Because of its light weight and all-around heat-transfer characteristics, it is also under consideration for nuclear-powered aircraft.

•

Merck will bring out a new tranquilizer. The chemical, benactyzine, has been used in Denmark and in England, has been under clinical test in the U.S. for a year.

It holds promise of working where other tranquilizers fail. The theory is that it prevents anxiety impulses from reaching the cerebral cortex, seat of the higher brain centers. Merck's name for it: Suavitil.

•

Two "secrets" that are by now common trade knowledge:

• The ultraviolet absorber that Monsanto incorporated into its new stabilizer system for vinyls (*CW, June 2, '56, p. 39*) is 2-hydroxy, 4-methoxy-benzopheneone. Certainly, some of it is supplied to Monsanto

by American Cyanamid, which sells the compound as UV Absorber 9. But some may also be supplied by General Aniline & Film, which markets the compound as Uvinol M 40.

The u.v. absorber is one part of the four-part system Monsanto developed to stabilize vinyls used in outdoor applications.

• The nonskid chemical being tested on railroad tracks (*CW Technology Newsletter, Dec. 22, '56*) is Du Pont's Ludox, a 33% solution of finely divided colloidal silica in isopropanol. When the test work was revealed, the three companies working on it (Reading Co., National Aluminate, General Electric) said only that the compound owed its effectiveness to its ability to cut through oil that drips onto tracks from journal boxes.

•

Levulinic acid can now be obtained in drum quantities. Quaker Oats, which makes the chemical in a pilot plant in Omaha, Neb., will produce 50 to 100 tons of it this year.

The simplest member of the γ keto-carboxylic acids, the chemical is made by treating the cellulosic material (remaining after the furfural is extracted from corn cobs) with strong acids at high temperatures.

•

American Potash has started production of boron trichloride and boron tribromide. This is the first time that the tribromide has been made on a commercial scale.

Ampot Vice-President Daniel Dinsmoor says that a semicontinuous process developed by the firm makes it possible to sell the trichloride at $1.60/lb. in ton quantities—down considerably from the $3/lb. price that's now being quoted. (Large quantities of boron trichloride will be used in new plants to make alkyl boranes. For example, Stauffer is Olin Mathieson's supplier for OM's Model City plant. Prices made on such contracts have never been revealed.)

•

Air Reduction will build a plant to make vinyl stearate. The plant, to be built at Calvert City, Ky., will make 2 million lbs./year, is due to start up the end of this year.

The firm is not saying anything about the process except that it was developed by Airco. But the U.S. Dept. of Agriculture has done a considerable amount of development on the compound. It worked up a method (*CW, Aug. 14, '54, p. 80*) of making it from acetylene and stearic acid by a reaction at 165 C, 200 psig. in the presence of a zinc stearate catalyst.

Airco is touting copolymers of the stearate: with vinyl acetate as vehicles for exterior emulsion paints; with vinyl chloride as a flexible coating; with vinyl chloride as a rigid plastic (if less stearate is used). The firm also plans to make polyvinyl stearate, a hard wax.

Three Elephant® brand

borax

Quality gets the right start in the manufacture of heat resistant glass, porcelain enamel and ceramic glazes with the presence of Three Elephant borates in the batch or frit. They substantially improve resistance to thermal shock, strength, durability, clarity and brilliance of your ware. It will pay you to standardize on your basic requirements with American Potash & Chemical Corporation—an acknowledged leader in the production and research of boron chemicals.

Use These Quality Boron Chemicals:

BORAX
technical, granular and powdered

V-BOR®
refined pentahydrate borax

PYROBOR®
dehydrated borax technical

BORIC ACID
technical and U. S. P.

TRONA

American Potash & Chemical Corporation

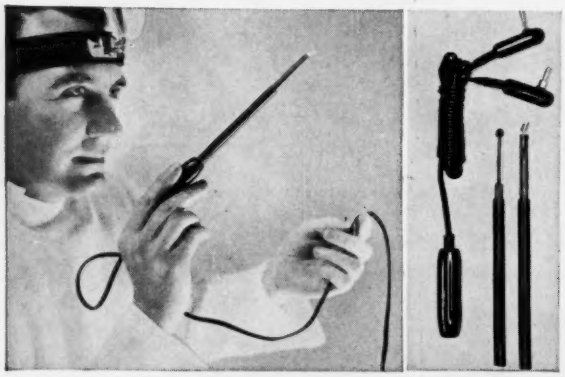
3030 West Sixth Street • Los Angeles 54, California

LOS ANGELES • NEW YORK • ATLANTA • SAN FRANCISCO • PORTLAND (ORE.)

Export Division: 99 Park Avenue, New York 16, New York

Life ...on the Chemical Newsfront

SINCE ITS FIRST APPEARANCE IN 1954, the spotted alfalfa aphid has spread like wildfire and now poses a threat to every alfalfa-growing region of the U.S. Unless controlled, this prolific pest can ruin fields. Since alfalfa is fed to cattle, and sprays often are needed as close as seven days to harvest, the insecticide must be effective yet not leave toxic residues. Cyanamid's malathion is the only recommended insecticide which fits both these specifications... and also offers safety in handling. Light area in photo shows complete destruction of alfalfa by aphids where the spray plane missed a corner of the field. **(Phosphates and Nitrogen Division)**



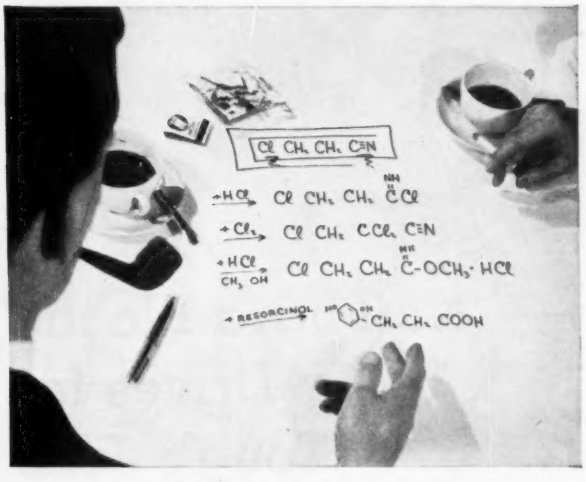
HIGH-FREQUENCY ELECTRODES are encased in mineral-filled CYMEL® Melamine Molding Compound in a new electrosurgical instrument manufactured by the Birtcher Corp. of Los Angeles. Used in the removal of tonsils, cervical cysts and surface growths, this instrument benefits from the excellent insulation and precision molding characteristics of CYMEL by insuring proper spacing and action of the electrodes. Handles and cord tips are molded of alpha cellulose-filled CYMEL, also an excellent insulator. All surfaces are exceptionally hard and chip resistant, and can be sterilized easily. **(Plastics and Resins Division)**

SMOOTH, PERFECT SURFACES on molded plastic products depend in part on a clean, even coating of mold lubricant. Stearates are commonly used for mold lubrication, and new processing equipment has been installed at Cyanamid's stearates plant to insure freedom from contamination at each manufacturing step. The resulting grades of aluminum, zinc, calcium and magnesium stearates can be counted on for trouble-free application where quality is critical. Molders of MELMAC® quality melamine dinnerware, for example, can count on Cyanamid stearates to obtain the characteristic fine surface finish. **(Industrial Chemicals Division, Dept. D)**

LASTING FRESHNESS CAN NOW BE "BUILT IN" to clothing, linens, and other textiles normally subject to perspiration-based odors. Having no significant odor itself, perspiration is subject to attack by certain bacteria which produce objectionable by-products. Cyanamid's new CYANA® Purifying Agent controls these bacteria, keeping the garments fresh indefinitely. Applied easily to textiles at the mill, CYANA Purifying Agent is unusual in its ability to maintain protection through repeated launderings, in many cases for garment's life. **(Organic Chemicals Division)**

VACUUM PACKING OF RUBBER ACCELERATORS is now carried out in Cyanamid's new MBTS (benzothiazole disulfide) plant. The new bagging process applies suction through the bag walls during filling, densifying the contents. The smaller, neater bag of Cyanamid MBTS is easier to handle, more efficient to unit-load and store. Free-flowing characteristics are not affected. Cyanamid is the first to apply this packaging technique to high-grade rubber chemicals.

(Organic Chemicals Division)



BETA-CHLOROPROPIONITRILE combines the reactivity of an aliphatic nitrile with that of an alkyl chloride, leading to many reaction possibilities including application in certain polymers. For example, a mixture of ethylenic compounds copolymerized in the presence of beta-chloropropionitrile leads to interesting elastomers. Extensive data on the reactions of beta-chloropropionitrile and many other promising intermediates and experimental samples of this reactive compound are available on request from Cyanamid.

(New Product Development Department)

CHEMICAL PROGRESS WEEK-APRIL 8-12

CYANAMID

AMERICAN CYANAMID COMPANY
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

Helping America Make Better Use of its Resources

CYANAMID 1907 50 1957

For further information on these and other chemicals, call, write or wire American Cyanamid Company

GENERAL ELECTRIC'S MOODY (left, with lab aide): From tricky chemistry, a hatful of new plastics bidding for molding jobs.

SHOW OF STRENGTH: Polycarbonate 'nail' is driven into lumber by GE market development manager Christopher.

Nail-hard Plastic Drives for Tough Jobs

If all goes well, plastics molders will be getting a brand new family of materials to work with in a year or two. Generically called polycarbonates, the resins feature unusual properties, loom as a distinct threat to nylon, fluorocarbons, etc., in some applications.

First inklings of the newcomers came from Germany (*CW, Technology Newsletter, March 30*), concerned research at Bayer's Uerdingen plant. But this week, an American entry in the field turned up, proving that U.S. researchers haven't been napping. Called Lexan, it's the outcome of fundamental research at General Electric's Schenectady, N.Y., laboratories and further studies by the chemical development department, Pittsfield, Mass.

In line with its novel chemical makeup (GE won't reveal details of its composition or method of manufacture), Lexan displays some unusual properties (*see box, p. 22*). Although it's thermoplastic, the resin rivals thermosets in some traits, looks particularly good in resistance to heat distortion, inherent strength.

At 140 C, 264 psi., Lexan's heat distortion is appreciably less than that of nylon, polystyrene, and the acrylics, is a shade more than that of phenolics. These competitive resins, and cellulosics as well, take a back seat to the newcomer when it comes to impact resistance. However, in tests of tensile strength (thousands of lbs./sq. in.) vs. increasing temperatures, nylon yields somewhat higher values.

...and one for the pot!

Witches of old brewed heroic broths to encourage visions, prognostications, spells, and spasms. Even unrequited love yielded to these near-lethal potions. Add the tail of a cat, the ear of a rabbit, sixteen varieties of tree roots, and a few "trigger" ingredients, known only to the witches guild... and stand back!

Folklore ignores the witches' maintenance problems, but such overwhelming corrosives must have liquidated many a cauldron inventory. After all, the witches had no titanium.

Titanium is available today, and it is the most promising metal for the chemical, textile and pulp industries ... or any place where severe corrosion presents forbidding maintenance or design problems.

Titanium is inherently passive to such vicious corroding agents as ferric, cupric, stannic and mercuric chlorides, and the hypochlorites. There is even little or no pitting or localized attack — a source of difficulty with practically all other metals. Stagnant conditions, surface deposits, fouling marine organisms and moist salt crystals are not troublesome to titanium. Strongly oxidizing agents in high concentrations and at high temperatures are readily handled with titanium. Slight additions of oxidizing agents to sulfuric, hydrochloric or phosphoric acid inhibit attack.

Titanium tubing, sheet, strip, plate, extrusions, bar and billet are all available from T.M.C.A.— and prices are dropping to competitive levels. T.M.C.A. technical service is available upon request.

... FIRST IN **Titanium**

TITANIUM METALS CORPORATION OF AMERICA, 233 Broadway, New York 7, N.Y.

These, plus "good" electrical properties, explains GE's market development manager, William Christopher, indicate possible uses of Lexan in coil forms, electronic and electrical components, film-form insulation, housings where strength or heat-resistance are important, gears, bushings, and certain parts that are now die-cast.

Even at a probable initial price of $2.50/lb. (none is currently for sale), the new resin is expected to be competitive (10-11¢/cu. in.) with die-cast bronze, may encroach on other materials as the price drops with large-volume production.

Says Christopher, "Lexan appears to offer opportunities to replace assemblies with one molded part." But the newcomer has its limitations. Although it is inert to aliphatic hydrocarbons, water, and dilute acids, the plastic is attacked by dilute alkali and is soluble in chlorinated hydrocarbons.

While GE won't say how it makes Lexan, the method probably parallels known polycarbonate synthesis procedures.

The following three techniques, already disclosed by Bayer, involve: (1) emulsion of a polyphenol in methylene chloride (the requisite polyphenols are only sparingly water-soluble), addition of caustic solution and phosgene plus a quaternary ammonium hydroxide catalyst; (2) a nonaqueous system utilizing an organic base (e.g., pyridine), polyphenol, phosgene, and a solvent such as carbon tetrachloride; and (3) ester exchange—a reaction between dialkyl carbonates (e.g., diphenyl carbonate) and the polyphenol.

Choice of the right alkyl carbonate is a tricky matter, since some of these boil at a relatively low temperature, making it difficult to keep the reaction system at a sufficiently high temperature for a long enough period of time.

Bayer researchers, H. Schnell, L. Bottenbruch, G. Fritz, H. Krimm and K. H. Meyer, have used the term 4,4′-dioxy-diphenyl alkane (an example

How to make polycarbonate plastics

1-A ketone reacts with phenol or a phenol derivative to yield a 4,4′-dioxy-diphenyl alkane . . .

2-Polymers are produced from 4-4′-dioxy-diphenyl alkanes either by alcoholysis with dialkyl carbonates . . .

3-Or by reaction of the former with phosgene . . .

How a polycarbonate measures up

General Electric's Lexan polycarbonate molding compound displays these properties*. . .

Impact strength (notched Izod)	12-16 ft. lbs./in.
Tensile impact strength	600-900 ft. lbs./cu. in.
Tensile yield strength	8,000-9,000 psi.
Tensile ultimate strength	9,000-10,500 psi.
Elongation	60-100%
Water absorption (24-hour immersion)	0.3%
Specific gravity	1.20
Melting point (crystalline)	514 F
Flammability	Self extinguishing

*Determined at room temperature on injection-molded samples. Ultimate properties of the new polymer may vary from listed values.

Price is no tall tale to this Texan

(He helps stabilize glycerine price through increased production)

You might say our production-control men are traffic policemen for synthetic glycerine at our new Velasco, Texas, plant. They keep a sharp eye on temperatures and pressures, and direct product flow.

When they say "go" with the twist of a valve—thousands of gallons of glycerine move one processing stage closer to customers. And how it is welcomed!

For, before this new plant existed, glycerine users were up against fluctuating prices. It was nigh onto impossible to anticipate future costs. Following the market was like riding a bronco sidesaddle. But now that's ended. The added production of our Texas plant has put glycerine on a stable price basis. What's more, it has stabilized supply.

For all the facts, write for our new booklet on synthetic glycerine. You'll find it a big help in charting the future . . . today! THE DOW CHEMICAL COMPANY, Midland, Mich., Dept. GD 800A-1.

YOU CAN DEPEND ON DOW

would be Dow's Bis-Phenol-A, *p,p'* isopropylidenediphenol) in disclosures of their work. GE's new-product development laboratory manager, L. S. Moody, refers to the resin's key ingredient as simply polyphenol. There are, he points out, a wide variety of polyphenols that can be used in making polycarbonates, accounting for the potentially large number of variations on the plastic.

Bayer makes no secret of having made at least 30 polycarbonates, using such alkanes as 4,4′-dioxy-3-methyl diphenyl-2,2-propane; 4,4′-dioxy-3,3′ diethyl - diphenyl - 2,2 - propane; 4,4′-dioxy-3,3′-diisopropyl-diphenyl-2,2-propane; 4,4′-dioxy-3,3′-5,5′-tetrachloro-diphenyl-2,2-propane; and 4,4′-dioxy-diphenyl alkanes.

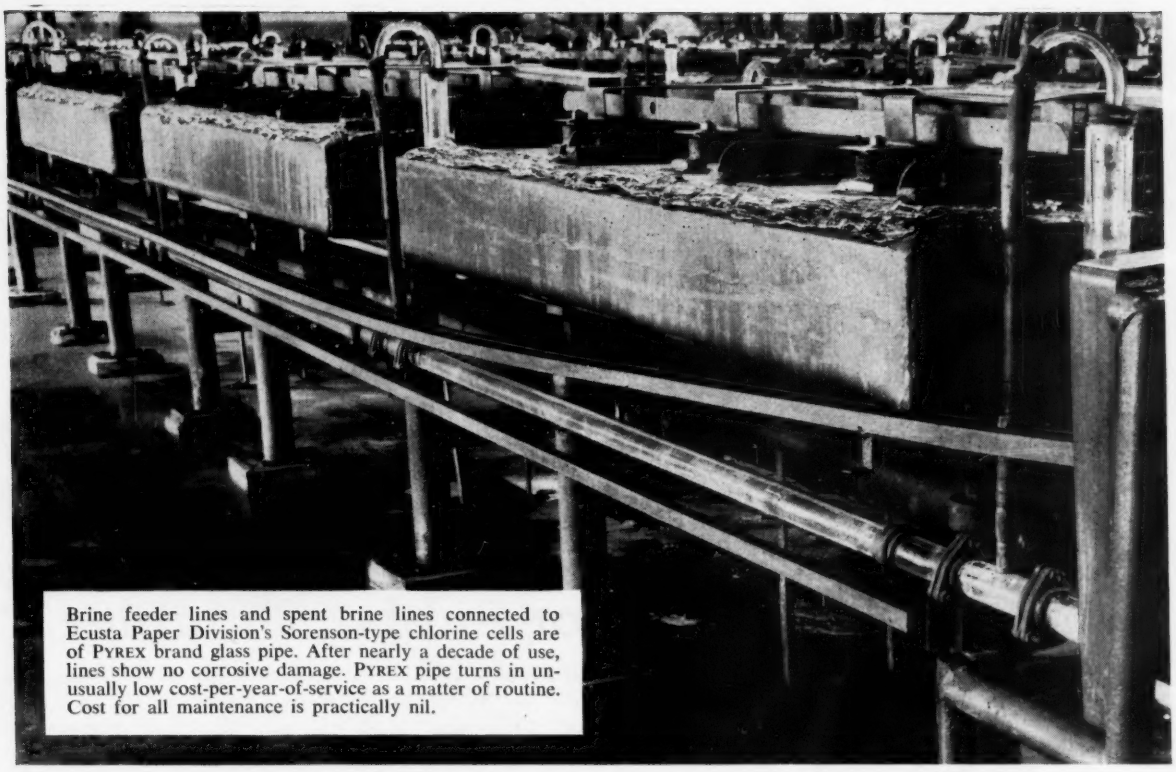
In general, the resulting polycarbonates resemble Lexan in physical characteristics, can similarly be made colorless and transparent.

Like Lexan, Bayer's new polycarbonates reportedly can be made with high impact resistance. They are resistant to water, higher alcohols, oils, fats, aliphatic and cycloaliphatic hydrocarbons. Methanol and most other organic solvents make the resins swell. But Bayer researchers haven't uncovered any correlation between the physical properties of particular polycarbonates and their chemical composition.

One Bayer resin, made from 4,4′-dioxy-diphenyl-2,2-propane, is said to have a tensile strength of 820 kg/cm^2, elongation of 180%, and an impact strength of 900 cm. kg/cm^2. A polycarbonate pilot plant is now operating at Bayer's Leverkusen plant.

GE researchers tentatively ascribe Lexan's properties to a structure containing short carbonate links—it's strong, sterically. In addition, they theorize, blocking of the para position in the polycarbonates lessens the traditional reactivity of the polyphenols, accounts for the resin's relative inertness.

So far, no other U.S. firms have aired what polycarbonate research they're doing, if any. The patent position on polycarbonates, as researched by Bayer and General Electric, is a long way from being resolved; GE spokesmen refer to the work of both companies as "parallel developments." Now that the potential of the polycarbonates is becoming clearer, it's likely that chemical companies will soon see and hear more of them.



Brine feeder lines and spent brine lines connected to Ecusta Paper Division's Sorenson-type chlorine cells are of PYREX brand glass pipe. After nearly a decade of use, lines show no corrosive damage. PYREX pipe turns in unusually low cost-per-year-of-service as a matter of routine. Cost for all maintenance is practically nil.

$6.32 annually covers chlorine producer's maintenance bill for 1600 feet of PYREX brand glass pipe

Lines show no corrosion after 9 years of exposure to brutal corrosive

Is your pipeline maintenance excessive?

How long should corrosion resistant pipe last?

Perhaps you can get answers to these two questions by comparing your plant history with that of the Ecusta Paper Division of the Olin Mathieson Chemical Corporation.

This Pisgah Forest, N. C. plant produces chlorine for their pulp and paper mill.

In 1947, Ecusta Paper installed 1½" glass pipe as brine feed lines, and 2", 3", and 4" glass pipe as spent brine lines.

Total cost for all glass line maintenance in the nine years to date amounts to $56.90, or $6.32 yearly. And the lines show no sign of corrosion, promise years more of positive corrosion resistance.

Rockbottom maintenance costs like this aren't common to all corrosion resistant pipe, nor is such a degree of resistance to corrosive attack. Yet users of PYREX brand pipe have been making such reports as a matter of course for over 20 years. The materials they pipe include some of the most corrosive chemicals in existence, like chlorinated hydrocarbons, all acids (except HF), strong bases at low temperatures and weak bases at high temperatures.

If you handle corrosives, you will never know how little you can spend for maintenance and replacement until you install PYREX brand pipe. Even a few lengths of test lines will help to prove the case for you. Our representatives will gladly work out a test set-up with you and you call the terms on operating conditions.

Or, if you prefer, we'll gladly furnish the names of PYREX pipe users near you and arrange a plant visit so you can get your own case history facts first hand. In the meantime, write, wire or phone us for the worthwhile reading described in the coupon.

CORNING GLASS WORKS
Corning, New York
Corning means research in Glass

Corning Glass Works, 23 Crystal Street, Corning, New York

Please send me the following Bulletins: EA-1, "PYREX brand Glass Pipe in the Process Industries" ☐; EA-3, "PYREX brand 'Double-Tough' Glass Pipe and Fittings" ☐; PE-3, "Installation Manual for PYREX brand 'Double-Tough' Glass Pipe" ☐.

Name ..... Title .....

Company .....

Street .....

City ..... Zone ..... State .....

SHELL LAB MEN†: In synthetic rubber, a place for magnesium.

Help for Rubber Troubles

This week, Shell Development Co. (Emeryville, Calif.) is taking the wraps off two materials designed to widen the use and lower the cost of butadiene-styrene rubbers. The pair: a new nonstaining, light-colored extending oil (Shell Oil Co.'s Dutrex 33) and a magnesium-based stabilizing system, both of which enhance the resistance of oil-extended rubbers to oxidative degradation.

Extending the rubber with oils cuts the rubber's cost, but can lead to quality and processing problems. Aromatic oils* are more compatible, blend-in faster with the rubber than do naphthenic oils. But the aromatics discolor readily, may migrate from finished rubber articles, promote oxidative degradation of the uncured master batch. Naphthenic oils therefore are used where light color is desired, also to impart more flexibility at low temperatures.

Dutrex 33, now being made in experimental quantities, is an improved naphthenic that reportedly approaches the aromatics in processing properties, while offering low volatility and light color. It's based on a specially refined West Coast crude, processed to remove color bodies and color formers, is aiming for jobs in white sidewall tire stock, etc.

Shell Development's other find is designed to thwart oxidative degradation which occurs in the presence of transition metal ions (e. g., iron, copper, manganese), is promoted by aromatic extending oils. Shell researchers report that addition of magnesium naphthenates or resinates to the extending oil prior to emulsification and coagulation of the latex-oil blend stabilizes the master batch efficiently, quickly, and cheaply.

Shell Development has applied for a patent on the stabilizers, expects that in practice they can be prepared as needed by mixing magnesium oxide with tall oil or resin acids.

Direct addition of magnesium sulfate to the acid (used as a coagulant) is also a possibility. But far more material would be required—about 1.6 parts of the sulfate per 100 parts of oil-extended rubber—than if the magnesium oxide were used. In either case, the additive reportedly does not affect the synthetic's processing or vulcanizing quality.

Its hopes for the system are based on the rather high cost of currently used additives.

However, rubber producers are looking at other stabilizers. Included: Crown Zellerbach Corp.'s β conidendrol (*CW, July 28, '56, p. 72*), which would cost about $1.50/lb. in large-scale production; chelating agents, such as Dow's Versenes (e. g., the tetrasodium salt of ethylenediaminetetra-acetic acid, which sells for 48-57¢/lb.).

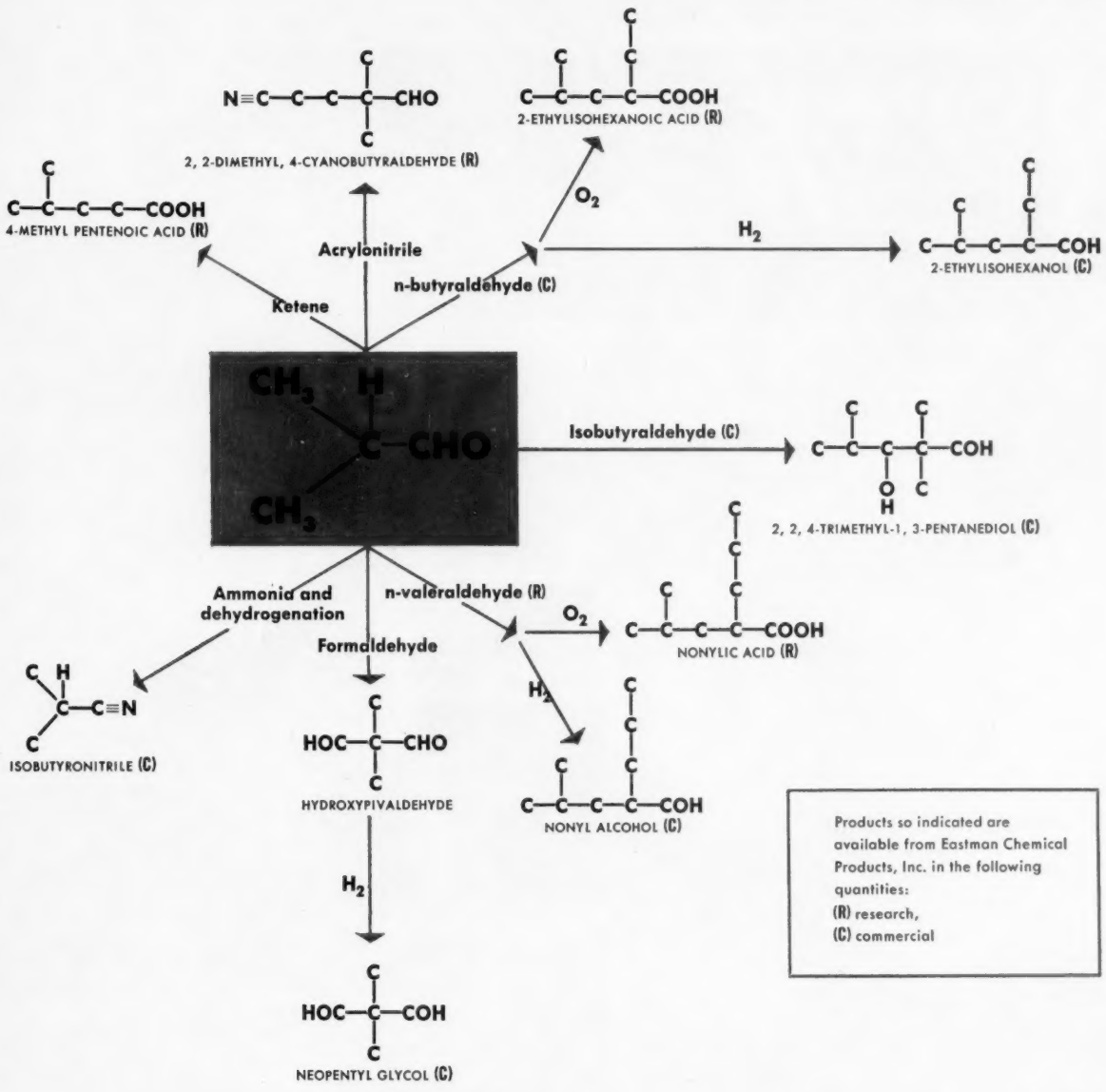
How well Shell Development's entries fare remains to be seen.

†Laboratory assistants Clark Reynolds (left) and John Zuvic.
*Extending oils are classified as aromatic, highly aromatic, or naphthenic.

For new routes and new products—consider these reactions of

ISOBUTYRALDEHYDE

a versatile chemical building block



Products so indicated are available from Eastman Chemical Products, Inc. in the following quantities:
(R) research,
(C) commercial

Commercially available in tank car quantities, Eastman isobutyraldehyde is one of the chemical industry's newest building blocks.

The reactions indicated here have been selected from among many as receiving the greatest amount of attention since the introduction of isobutyraldehyde as a basic raw material.

Useful in themselves or as intermediates, these derivatives of isobutyraldehyde are becoming increasingly important as a source of solvents, plasticizers, pharmaceuticals, polymers, resins, insecticides, hydraulic fluids and lubricants.

Samples of isobutyraldehyde and of those derivatives so indicated are available for your evaluation. Write to us at Kingsport, Tennessee or contact our nearest sales representative.

Eastman
CHEMICAL PRODUCTS, INC.
KINGSPORT, TENNESSEE
subsidiary of Eastman Kodak Company

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; New York City; Framingham, Massachusetts; Cincinnati; Cleveland; Chicago; St. Louis; Houston. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

RESEARCH

"Crashing" for a Cure

Drug makers are this week taking stock of their cancer chemotherapy research programs. They're weighing the possibility of expanding these studies if a new government-sponsorship plan (*CW, Technology Newsletter, March 30*) should be approved.

The idea, calling for a $5-10-million annual federal subsidy, is picking up important backing in Congress, among government cancer experts, and in major drug and chemical firms.

Proponents hope that an industry-wide crash program, sparked by the financial aid, will speed a cancer cure. In the past, high research and development costs, plus the probability that a successful drug would immediately become public property, have made such research by private firms a high risk venture.

In response to a request by the National Cancer Institute (U.S. Public Health Service), ten drug and chemical producers have come up with estimates on what it would take in federal funds to induce them to shift their research and development emphasis to cancer drugs. Their estimate: $5.2 million (matched by sizable company spending in most cases) for the year starting July 1, 1957.

The plan, drawn up by the institute's chemotherapy director, Dr. Kenneth Endicott—after talks with three top industry experts*—includes patent protection features for industrial participants, and assurances that commercial rights will be safeguarded.

Drug companies have other reasons, too, for showing more interest in cancer research. One is the unexpectedly large number of promising leads turned-up by the Cancer Institute's chemical screening program. The institute is spending $4.5 million annually, looking for tumor-fighting agents among 25,000 compounds it surveys each year; 8,000 of these are synthetic chemicals and 17,000 are antibiotic "beers." Nearly all of these are donated by drug and chemical firms (the full measure of present industry contributions to the government program).

If federal funds materialize, more industry aid is certain.

*Including Merck's president, John Connor; American Cyanamid's patents and licenses counsel, Austin Phillips; and Maurice Moore, Vick Chemical research vice-president and chairman of an eight-man drug industry advisory group to the institute's chemotherapy program.

PHOTO COURTESY, T. BAUMRITTER CO.

Where Clarity in Lacquers is Vital... Specify Celanese Solvent 601

Lacquer solutions are protected against color build-up during storage

The ability to inhibit color build-up in nitrocellulose lacquers—even after long storage—is but one of the many advantages of Celanese Solvent 601.

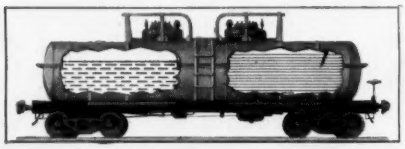
This quality solvent compares in solvent power, evaporation rate and other properties to higher cost methyl ethyl ketone...is offered as a replacement in both vinyl and nitrocellulose formulations.

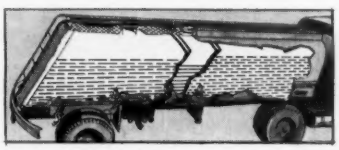
Check with your Celanese representative about the many advantages of Celanese Solvent 601. Write for special literature:

Celanese Corporation of America, Chemical Division, Dept. 552-D 180 Madison Avenue, New York 16, N. Y.

Celanese®

Get the Economy of Split Shipments. Fill *all* your solvent needs with Celanese compartmented tankcar or tankwagon delivery, and enjoy the advantage of CL prices! Available from district storage points in Newark, Chicago, and Bishop, Texas.





Celanese CHEMICALS

RESEARCH

PRODUCTS

New Calmer: Schering Corp. (Bloomfield and Union, N.J.) is making its new tranquilizer, Trilafon (perphenazine), available to physicians. The compound is said to be five times more potent than chlorpromazine, feature safety in the treatment of mild-to-severe mental and emotional disturbances.

•

Reagent Entries: Among 13 new chemicals in the Distillation Products Industries—division of Eastman Kodak Co. (Rochester, N.Y.)—line, is a reagent for determining sulfur dioxide or smog in air. It is 2-*p*-dimethylaminostyryl-1,3,3-trimethyl-3H-pseudoindolium iodide. Other entries are 3,3'-dimethylnaphthidine (useful for determining chlorine in water, as an oxidation-reduction indicator, etc.) and 4,5-dihydroxy-3-(*p*-sulfophenylazo)-2,7 naphthalenedisulfonic acid trisodium salt. An indicator, the latter can be used for titrimetric determination of microgram amounts of fluoride ion.

•

Versatile Silicone: Kirkhill Rubber Co. (Brea, Calif.) is manufacturing a new silicone rubber that retains useful properties over a −65 to 600 F temperature range.

•

Hot Biochemicals: C^{14}-L-leucine and C^{14}-L-isoleucine are now available from Schwarz Laboratories, Inc. (Mount Vernon, N.Y.). Nuclear-Chicago Corp. (Chicago) now offers DL-tryptophan-3-C-14. The radioactive amino acids are for biochemical research.

EXPANSION

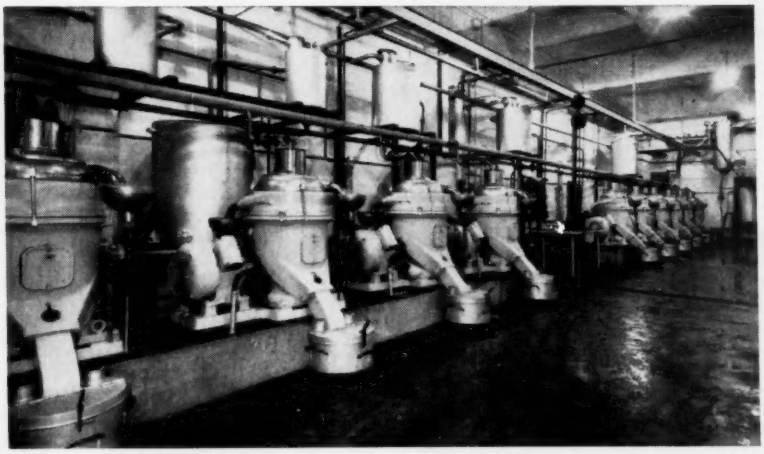
Du Pont has started construction of a fifth laboratory building at its Chestnut Run (near Wilmington, Del.) sales service research center. The new laboratory will be operated jointly by the firm's pigments and electrochemicals departments. Cost: about $5 million. It is expected to be ready for use by spring of 1958.

Purdue University's (Lafayette, Ind.) recently-established Thermophysical Properties Research center is set for a three-year basic probe of thermal conductivity, viscosity, specific heat, thermal emissivity, absorptivity and reflectivity, mass diffusivity, thermal diffusivity, and Prandtl number (the product of a liquid's

Corrosioneering News

Quick facts about the services and equipment available to help you reduce corrosion and processing costs.

Published by The Pfaudler Co., Rochester, N.Y., U.S.A.



In a single pass, these ten Titan No. 70 Superjectors separate animal fat, wash water, and solids.

Continuous centrifuging of slurries up to 35% solids

Titan Superjectors operate as long as a month *without shutdown for cleaning*

Now you can centrifuge *continuously* —eliminating costly, time-consuming clean-outs—with Titan Superjectors.

A series of ¼" slots around the bowl circumference discharge solids rapidly. Even with a slurry containing 35% solids, this cleaning action is completed in just 10 seconds.

The bowl's own centrifugal force builds up the hydrostatic pressure which opens the slots.

You can control this action manually or set it for automatic operation at prescribed intervals.

Concentrate solids up to 40%

Because the openings of the Titan's desludging *slots* are larger than those on nozzle-type centrifuges, much drier solids can be obtained. You can concentrate solids to as low as 40% moisture content and also produce much clearer effluents at the same time.

The Titan Superjector handles mixed solid sizes up to ⅛" diameter. It removes solids either heavier or lighter than infeed.

Settling vanes within the Superjector curtail turbulence and shear of solids. You can adapt infeed holes and disc spacers closely to your product by selecting from the wide range of discs available.

Some typical installations

The following list gives some idea of the wide range of installations in which the Titan Superjector has proved its value:

Separating liquids from animal intestines for pharmaceuticals.

Refining vegetable oils.

Purifying waste lubricating oils.

Extracting fish oils.

Recovery of yeast and cereal proteins.

Lower running cost, other features

Since there is no braking effect from the continuous discharge of solids in the Titan Superjector, its power consumption is exceptionally low.

And, because many of its parts are interchangeable, you can convert the Titan to a variety of services at relatively low cost.

You can eliminate foaming, aeration, and gas loss by having the Superjector hermetically sealed and discharging fluids under pressure.

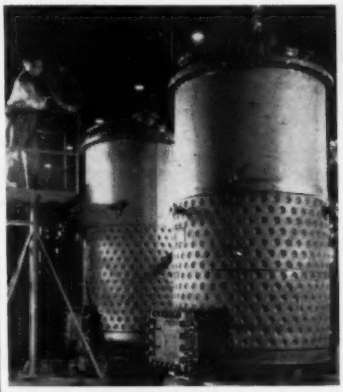
For further information, write for Bulletin 930.

Herculoy added to Pfaudler arsenal of materials to combat corrosion

You can now specify Herculoy, a silicon-bronze alloy "A," when you purchase Pfaudler equipment.

This latest addition to the Pfaudler list of fabrication materials gives you all the corrosion resistance of copper with the tensile strength of mild steel.

Highly recommended for marine service, Herculoy is readily applicable to all oxidizing environments.



The first all-Herculoy vessels fabricated by Pfaudler in which "dimpled" jacket construction was employed.

The vessels shown above are each 970-gallon capacity and constructed throughout of Herculoy #420. Service requirements called for a 150 psi jacket pressure with a 10 psi internal pressure at a maximum operating temperature of 239° F. Stress relief at approximately 850° F. followed by air cooling was employed to further the corrosion resistance of these Herculoy vessels.

Of further significance, these vessels employed the unique Pfaudler "dimpled" jacket construction. The "dimpled" jacket design permits higher pressures than conventional jacket designs without any increase in wall thickness.

Whether your material specifications call for Herculoy, Everdur, titanium, copper, nickel, Inconel, clad materials, *stainless steel*, or *glassed steel*, Pfaudler technical skills and facilities are ready to work for you.

RESEARCH

specific heat and viscosity divided by its thermal conductivity). Budgeted at $75,000 a year, the research is being sponsored by Babcock and Wilcox Co., California Research Corp., Esso Research and Engineering Co., Office of Naval Research, and Standard Oil of Indiana, among others.

Diamonite Products Manufacturing Co. (Canton, O.) has opened new research, product development, and pilot-production facilities for its studies of high alumina ceramics. Diamonite makes high-alumina ceramic components for electronics, wear - corrosion - and heat - resistant parts, oxide cutting tools, and high-density grinding media.

Schering Corp. has completed plans for a $3.5-million chemical research laboratory to be built at its home office site in Bloomfield, N. J.

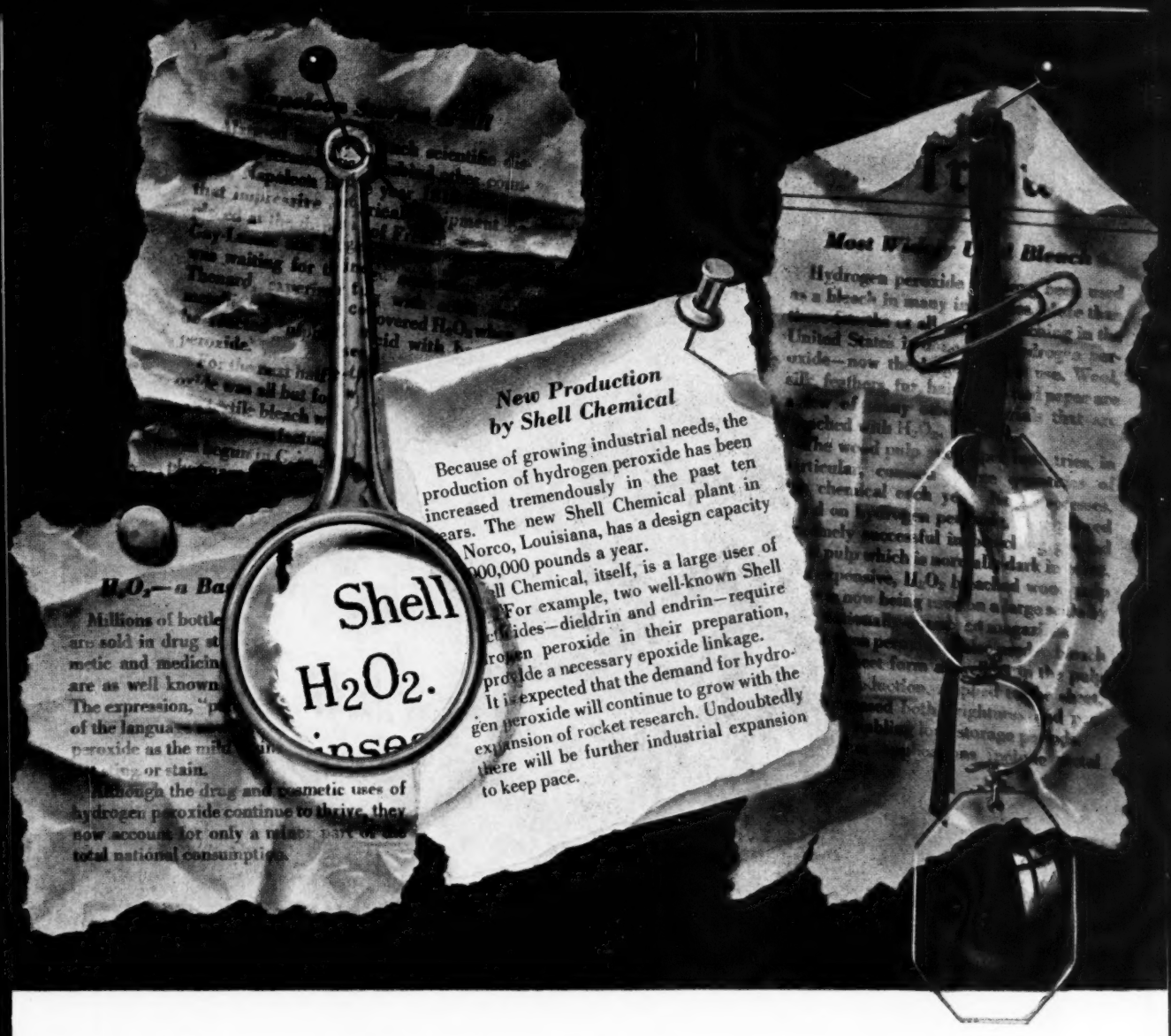
Socony Mobil has purchased a 315-acre site near Princeton, N. J., for a planned nuclear research center.

Mellon Institute's (Pittsburgh) board of trustees recently adopted plans calling for a major expansion in the organization's fundamental research. The institute won't give up applied re-research, however.

REPORTS

These New reports are available from the U. S. Dept. of Commerce, Office of Technical Services (Washington 25, D. C.):

- "Evaluation of Rot-Resistant Treatments for Elastomer-Coated Fabrics" (PB 121420, $1.25) concludes that choice of treatment should be made only on the basis of technical information insuring the compatibility of fabric, protectant and coating under conditions of processing, storage and use.
- Results of recent research in nucleonics by the Naval Research Laboratory are available in two reports: "Calculated Efficiencies of NaI Crystals" (PB121419, $1), which covers the probabilities for the interaction of gamma-rays with sodium iodide scintillation crystals; and "Solubility and the Products of Reaction between Iron and Water at 26 C and 300 C" (PB 121409, 50¢), which concerns the problem of magnetite (Fe_3O_4) formation in pressurized water reactors, deposits of which interfere with the heat transfer to the coolant.



Light reading is always best

PRINT on dull, unbleached paper and the sharpest eyes find the reading tough because the contrast is poor. But bleach the paper white with H_2O_2—your old friend "peroxide"—and your eyes can race across the page.

As used in papermaking, hydrogen peroxide offers many other advantages: It bleaches pulp with minimum weakening of finished paper. It creates a paper that stays white longest. It enables the paper industry to use *all* of the valuable pulp, bleaching without destroying.

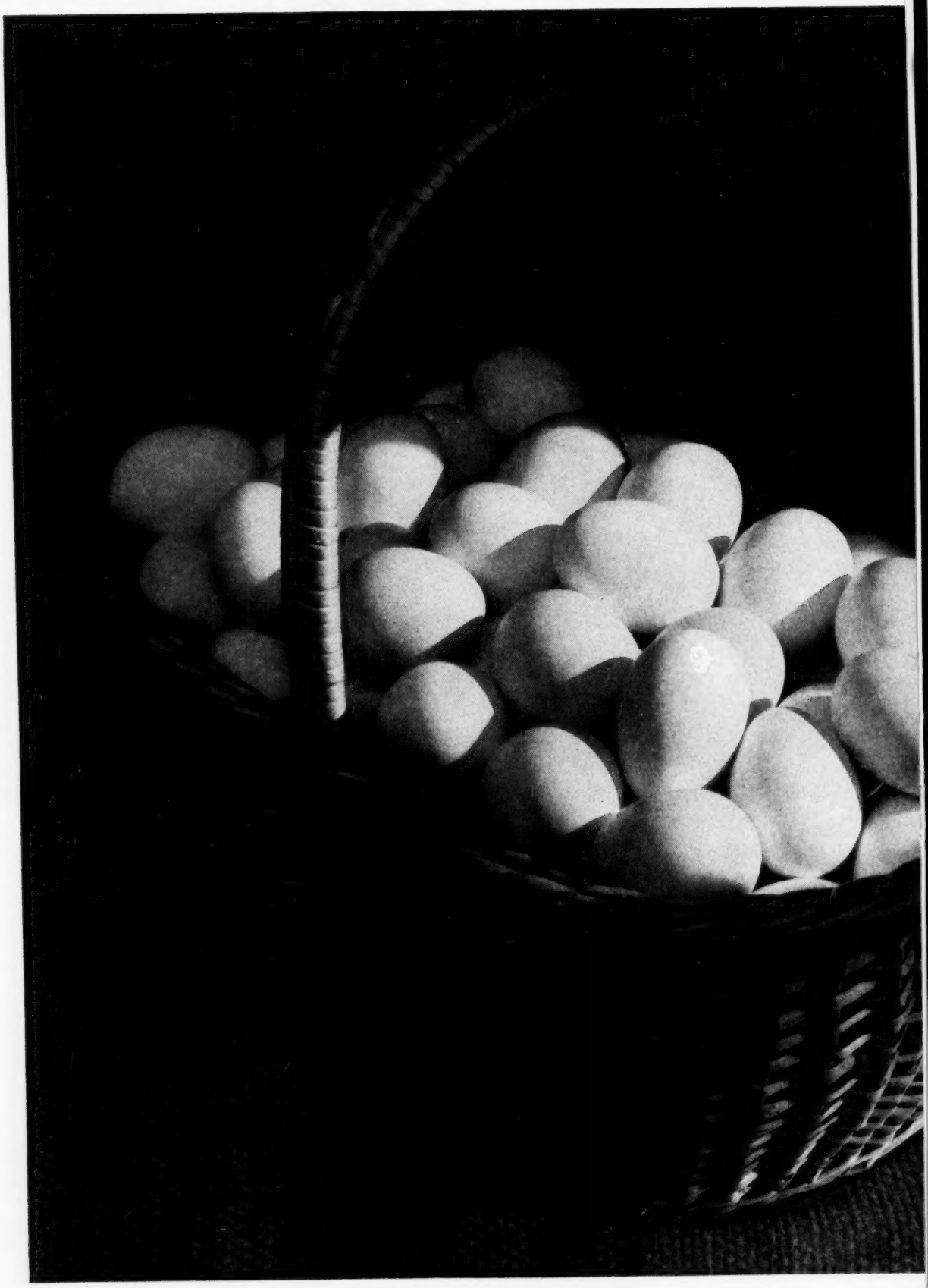
Advantages such as these tell why demand for H_2O_2 continues to grow wherever industry needs this oxygen-rich chemical—in textiles as well as paper, metal finishing as well as chemical processing. Shell Chemical, looking to tomorrow, is preparing to help fill these needs with a new plant for the manufacture of pure hydrogen peroxide at Norco, Louisiana.

Shell Chemical Corporation

Chemical Partner of Industry and Agriculture

NEW YORK

SHELL



Can a chemical distributor afford to put all his eggs in one basket?

There are those in the chemical industry who believe distributors should not sell competing brands . . . that distributors should be exclusive in their area.

And they can build up a good case for their point, using the accepted practices of other industries.

The fact is that no industry in America can be compared to the chemical industry. Because the chemical industry is unique.

Consequently, the chemical distributor occupies a niche all to himself . . . a niche that is wholly different from that of other types of distributors.

For example, a chemical distributor cannot always put all his eggs in one basket and make money. We fully realize that. For a good chemical distributor is always on the lookout for new products to broaden his base . . . to be able to furnish a wider range of chemicals for more and different needs of his customers.

We do believe, however, that a distributor should take pride both in his own company and in the manufacturers he represents. He should take on new lines only after careful consideration, making sure that each product he adds meets the needs of his customers in the best possible manner. If he adds new products indiscriminately, for immediate or temporary profit, he may be destroying the brand preference upon which his business is built.

For many years, Wyandotte has actively promoted the sales of its products through distributors. The Wyandotte distributor policy is clear-cut and written down. And most important, it is realistic and workable.

Wyandotte CHEMICALS

MICHIGAN ALKALI DIVISION

WYANDOTTE CHEMICALS CORPORATION, WYANDOTTE, MICHIGAN

Offices in Principal Cities

These two experts can help solve your methyl chloride and methylating problems

Our Messrs. Neuville and Zellner (left to right above) cover all the bases when it comes to methyl chloride application and the special field of methylation. They come by their particular specialties honestly. Since 1936 Ansul has been a constant and expanding source of supply for bulk methyl chloride in the domestic and export markets. In the field of methylation alone (Morrie Neuville's specialty) Ansul has successfully methylated more than 100 compounds.

The methylation laboratory at Ansul is equipped to take over a methylating problem of yours at any stage of development. Manufacturing facilities for producing commercial quantities of a methylated compound to your specification are also available.

As a major producer of methyl chloride, Ansul is prepared to supply you with quantities ranging from laboratory containers to cylinders of 100 pounds, 140 pounds, and 1,300 pounds. Tank cars of 40,000 pounds and 78,000 pounds are available. Delivery is prompt.

For general information about methyl chloride and its bulk application, write to Bob Zellner. Questions or just conversation relating to methylation should be addressed to Morrie Neuville. THE ANSUL CHEMICAL COMPANY, DEPT. C-12, MARINETTE, WISCONSIN.

ANSUL

U.S. OUTPUT OF PLASTICS AND RESINS

(million pounds)

	1953	1954	1955	1956*
Vinyl resins	464	514	664	725
Styrene resins	468	458	572	590
Polyethylene	130	205	350	510
Phenolic resins	426	392	483	475
Coumarone-indene and petroleum polymer resins	202	216	283	360
Urea and melamine resins	239	245	300	295
Alkyd resins	265	259	304	190
Cellulosics	129	121	142	145

*Source: U. S. Tariff Commission; 1956 based on estimates by J. C. van der Hoeven, of Koppers Chemical.

Plastics: The Big Picture

The plastics industry—where it has been, where it is now, where it's headed. These, and a raft of other topics concerning just about every facet of the fastest-growing segment of the chemical and allied products industry, were answered last week at the Commercial Chemical Development Assn.'s 13th annual meeting in New York's Hotel Statler. Theme of the get-together: plastics—from raw materials to retail selling.

Setting the mood for the all-day session of formal talks and panel discussions was Du Pont's Russell Weigel, sales director, Plastics and Polychemicals Dept. He drew attention to the plastic industry's practice of continually exceeding most growth forecasts.

For example, a growth curve based on plastic sales prior to 1942—when the first sharp rise in plastics consumption was about to begin—indicated a sales volume of about 650 million lbs./year by 1956. That prediction proved very conservative, of course, because plastic sales last year, Weigel noted, "exceeded 3 billion lbs., and this does not include some 500 million lbs. of alkyd-type coating resins."

Further projection of this growth rate, he said, would spot total plastic sales (not including alkyds) at 18 billion lbs./year by 1975. Such growth is not assured, of course, but neither can it be ruled out—especially in light of the plastics industry's past performance.

Clearly, plastics is now "big business," even if compared with important metals such as aluminum, copper, zinc. The more than 3 billion lbs. of plastics sold in '56 stacks up well when compared with last year's sales of aluminum and refined copper (approximately 3 billion lbs.). Plastic sales greatly exceed the 2 billion lbs. of slab zinc sold.

Four Applications: The competitive impact of plastics is felt in virtually every type of manufacturing. To illustrate, Weigel categorized plastics end-uses into four general classes.

It's evident that plastics frequently replace other materials; and there are indications now that items such as copper pipe, tin cans, steel automobile bodies will likely be replaced by plastic products. Favoring such a replacement are the concurrent downward trend of most plastics prices and climbing costs of metals.

In some cases, however, plastics are extending the use of conventional materials, e.g., the use of paper/polyethylene combinations when neither alone is suitable for a particular application.

Some plastics, of course, have created new markets of their own—the packaging of heavy produce in polyethylene film is a case in point.

The category least pleasing to plastics manufacturers includes those uses in which plastics replace other plastics; the resulting heavy intra-industry competition is often unpleasant, yet unavoidable in such a fast-growing business.

Outlet Shift: There's a trend, now, toward use of plastics in large-scale industrial applications, as contrasted with earlier emphasis on use in smaller items such as toys and nondurable goods.

Kopper's B. J. C. van der Hoeven (vice-president and general manager, Chemical Division) pointed out that "this trend is of the utmost interest to the industry." One reason: the trade sells less than 10% of its output to the home construction field; but the plastics industry would have to double its capacity if as little as 5% of the money spent annually for home construction in the U.S. were diverted to purchase of plastic construction materials.

There's a "fundamentally good" chance that plastics will get into such fields as home construction, pipe manufacture, etc., in a big way, avers van der Hoeven. Side-stepping any forecast that large-scale usage here of plastics is imminent, he was content to echo the optimism of others concerning the generally bright future for plastics. Demand, he noted, may reach a 6-billion-lbs./year level by 1960; per capita consumption would then range from 32-35 lbs., compared with the present rate of 24 lbs./capita.

Enough Hands: How sprawling is the plastics industry? John J. O'Connell, president of Consolidated Molded Products, gauged its spread like this: an estimated 4 billion lbs. of plastics in raw material form were produced last year by approximately 150 companies; in partly finished or finished form, the same 4 billion lbs. "passed through the hands of more than 6,000 fabricators, processors or converters."

Significantly, O'Connell pointed out that the present rates at which plastics are processed "must be increased manyfold" to seriously threaten the position of older-line fabricating materials such as steel.

Another Boom in Small-Homes Construction Could Dictate This Timetable* for Introduction of Plastic Parts

1956 Interior surfaces, skylights, insulation

1957 Pipes, hardware, lighting fixtures, luminous ceilings

1958 Partition walls

1959 Outside walls, plumbing fixtures, roof panels

1960 Complete window assemblies

1961 Bathroom modules with molded-in pipes and fixtures

*From panelist George Boehm, *Fortune* science writer.

In discussing prices, O'Connell said that in "shining contrast to almost everything else, prices of plastic materials either have been coming down steadily or have remained remarkably steady at levels of several years ago. It may be expecting too much, in the face of such a record, to look for sharp decreases in existing price structures."

Panel Probings: For the afternoon session, CCDA attendees split into four groups for semiformal panel sessions. Of particular interest to plastics marketers was the panel moderated by M. J. Tierney, of Naugatuck Chemical, which analyzed "The Marketing Job Ahead in the Plastics Raw Material Industry."

Thrusting some sobering thoughts into the generally optimistic tone of the meeting, J. F. Bohmfalk, of Clark, Dodge and Co., observed that "some disquieting things are now beginning to occur." A decided deceleration in the rate of growth shown by many plastics, for example, indicates that plastics are perhaps "halfway between the stages of infancy and maturity."

With pungent phrasing, Bohmfalk emphasized problems such as competition among plastics, pressure on plastics prices, compression in profitable product life, the "specter" of vinyl resins fabricators practicing making their own resins, the need of growth in polyurethane consumption, the unlikelihood that usage of low-pressure polyethylene will be great enough to consume all current capacity before 1960-62.

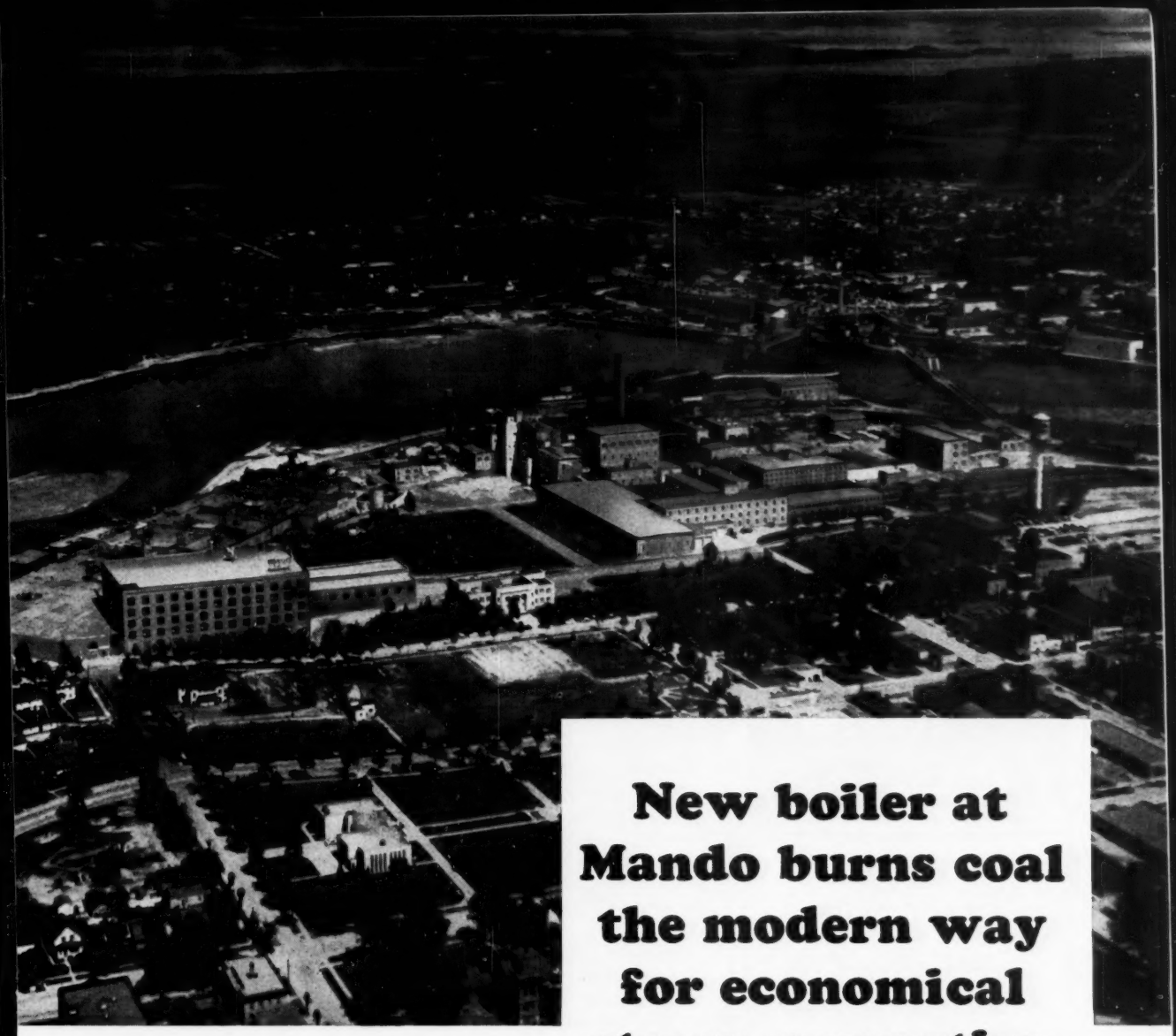
All at Once—Too Much: CHEMICAL WEEK Editor Howard C. E. Johnson further analyzed the problems of competition and overcapacity beleaguering plastics producers. "The great ferment," Johnson said, "is in polyethylene, reinforced plastics, vinyls. Teams of market researchers have persuaded their respective companies to seize the opportunity and build polyethylene plants. There is nothing wrong with their figures—except that too many researchers have come up with the right figure at the same time."

High-pressure polyethylene capacity, plus the complicating factor of forthcoming capacity for low-pressure material, will bring total capacity by '60 to about three times the '56 sales.

The big questions are: Can the industry triple—or even double—polyethylene sales in four years? And if it can, won't it be done at the expense of polystyrene, cellulosics, and other categories of plastics?

George Boehm, of *Fortune*, also viewed the plastic industry's planning as a "long-range gamble"—a bet that the national economy will continue to flourish at least through the early '60s. To evaluate the odds, Boehm sketched promising plastic outlets in such fields as the automotive industry, housing, and home furnishings.

But perhaps the generally unsubmerged optimism that now prevails in the plastics industry—despite the serious problems that lie ahead—was best explained by Bakelite's C. W. Blount, who emphasized that the key to success in the future lies in "imagineering"—the imaginative development and marketing approaches that have already pushed the plastics industry to its present position of importance.



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Mando—the Minnesota and Ontario Paper Co.—is keeping pace with continuing production expansion. The firm recently installed in its plant at International Falls, Minn., one of the largest modern single-pass boilers in the pulp and paper industry. It is designed to produce 240,000 lbs. of steam an hour, bringing the mill's steam generating capacity to 960,000 lbs./hr. The new boiler has 22,500 sq. ft. of heating surface and required 300,000 lbs. of steel in its construction. It will use 775,000 gallons of water a day and, for economy, will burn pulverized coal as a primary fuel—300 tons daily!

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Israel: Chemical Comer

The progress being made by Israel's chemical industry doesn't make headlines. But chemical marketers in the U.S. and elsewhere might well take note of these late dispatches from Haifa and Tel Aviv:

- Israel, says the director of Chemical & Fertilizers Ltd., is already self-sufficient in fertilizers, and small quantities are available for export.
- The country will shuck dependance on calcium carbide imports when a new plant, under construction at Petan Tiqva (near Tel Aviv), starts production late this year.

Indicative of Israel's expanding fertilizer industry is the fact that at least three important products—ammonium sulfate, potassium sulfate, and ammonia—were produced in large-scale quantities for the first time during the past year.

Ammonium sulfate production, nonexistent in '55, hit some 30,000 tons in '56, and is expected to come close to utilizing the country's total capacity of 60,000 tons/year during '57. Potassium sulfate output stepped up impressively from '55's level of 500 tons/year to 3,600 tons in '56. This year, production of about 6,000 tons is foreseen, only 1,000 tons short of total capacity.

Ammonia production, too, has shot up surprisingly. Output during '56 reached nearly 8,000 tons (nothing in '55), and may just about match Israel's 14,400 tons/year capacity in '57.

But if the foregoing increases seem impressive, note these changing patterns of sulfuric acid and superphosphates production. Sulfuric turnout in Israel last year inched up some 2,000 tons above '55's 72,000, and will soar to an estimated 100,000 tons this year.

Production of superphosphates in '56 came to 96,000 tons (vs. 101,000 the previous year), but is expected to bounce up to 105,000 tons in '57—and that's only 5,000 tons less than capacity.

Although Israel's exportable surpluses may one day become large enough to cause some concern in world markets, this year only potassium sulfate is being described as having a "major export surplus." Some 4,500 tons are expected to be available for sale abroad in the coming 12 months.

Carbide Independence: Israel now is importing calcium carbide from Norway, Finland, and Yugoslavia, at an annual cost of some $400,000. The new plant, which may be in operation before the end of '57, will be able to produce about 4,000 tons/year. Local requirements are pegged at 3,000 tons; hence, Israel will, by next year, switch from calcium-carbide importing to exporting.

But calcium carbide is only part of the country's ambitious plans for a larger complex of plastics plants that will produce everything from raw materials to a wide range of finished products.

Israel's expanding chemical production—and exports—may not be hefty enough in the next year or so to seriously affect world markets. But the straws from Israel now blowing through trade channels are looming large to global-minded marketers.

Argon Aid

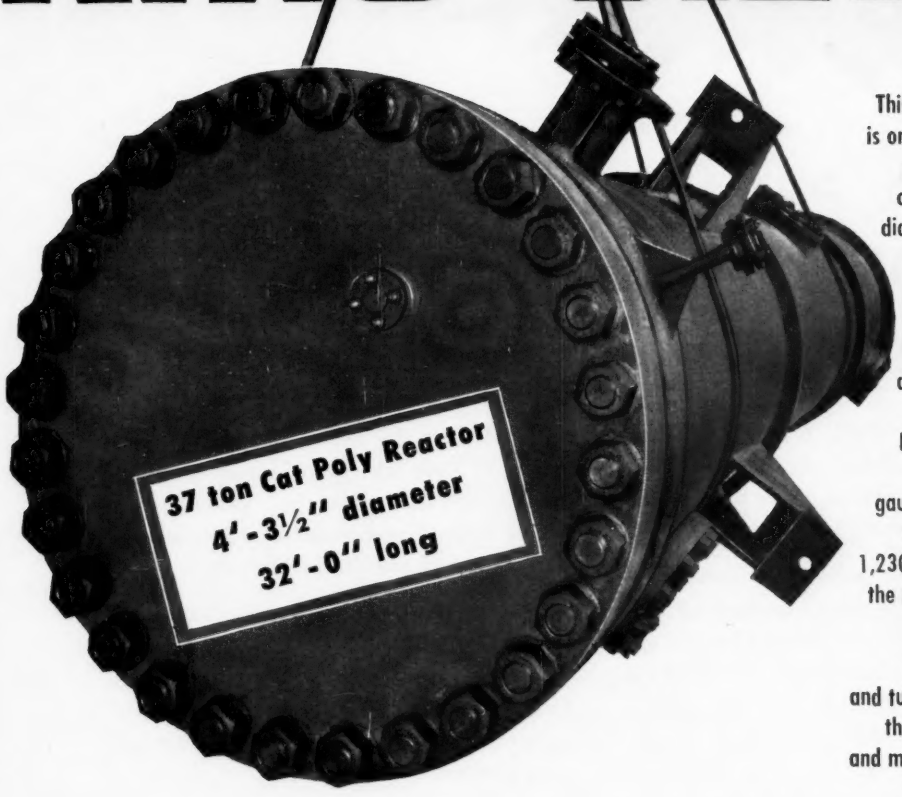
The government came to the aid of civilian users of argon last week by ordering producers, in effect, to set aside 15% of current production for civilian requirements.

The order (M-108, Business and Defense Services Administration) set a ceiling of 85% of scheduled output that may funnel to essential defense needs including Defense Department and Atomic Energy Commission orders. The limit applies to all 15 of the country's argon producers, took effect on production schedules for the last week of March.

BDSA, however, stressed that the new control action was of a "temporary" nature, and was needed to cope with a "serious shortage" arising from work stoppages at two of the nation's largest producing plants. Controls will be revoked, said BDSA Administrator Horace McCoy, when the "dislocation of supply no longer exists in any substantial way."

The refined argon consumption curve is—and has been—undergoing a dramatic upward climb, attesting to its essentiality in production of defense and civilian items. Use during '56 hit an estimated 320 million cubic feet, a

KING SIZE



This giant 37 ton Cat Poly Reactor is one of 4 units shipped to a large petroleum refinery in the State of Washington. It is 4'-3½" in diameter by 32'-0" long and has a 1 3/16" thick shell. Each of its 8" thick heads is attached to the shell channel with 28 special alloy stud bolts 2¾" diameter by 15¼" long having nuts 4¼" across the flats. Into the 5¾" thick tube sheets 190 tubes, 2½" O. D., No. 5 gauge and 30'-0" long, are rolled and seal welded. Designed for 1,230 lbs. pressure on the tube side, the reactor was completely X-rayed and stress relieved.

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50% jump over the '55 level. Indications are that during '57 there will be an additional 25-30% increase.

Much of the skyrocketing demand (says an earlier BDSA report) is attributed to rapid advances in the application of the argon-shielded electric arc to the automatic welding of both ferrous and nonferrous alloys.

An added argon-use fillip is expected with installation of additional automatic welders and the availability of quantities of argon in a purity of 99.97% or higher. This will permit its use as a shielding gas in processes where argon's use has not previously been feasible.

The BDSA order, though not a panacea for the current argon tightness, will ease the pinch for hard-pressed civilian consumers.

Canadian Paint Gain

The past year was a good one for the Canadian paint industry, dollar-wise. Total sales probably exceeded the $115-million record in '55, according to Eric Barry, speaking for the Canadian Paint, Varnish and Lacquer Assn.

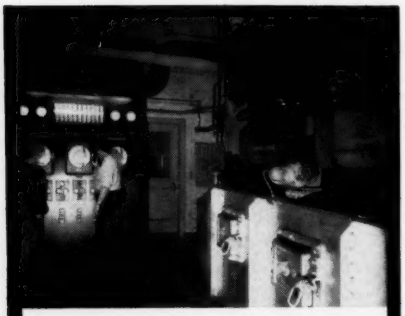
"But it must be admitted," says Barry, "that the over-all industry picture is not as pleasant as the dollar figures seem to indicate." The paint industry, with some exceptions, actually sold fewer "trade sales" materials in '56 than in the year before. Some of the reasons: the proportion of poor weather during the painting season, increase in the use of competing materials, a fall-off of housing starts, and substantial inventories in dealers' hands during early '56.

Sizable increases in the volume of industrial coatings sold last year stemmed from gains that were made in the production of automobiles, household appliances, industrial and office equipment, and from the very high level of capital spending in Canada during '56.

Canadian paint manufacturers, says Barry, faced steadily rising costs in '56, and these increases were a factor in offsetting some of the dollar gains.

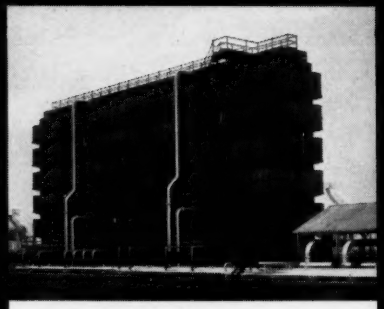
This year, he added, will also bring its quota of problems to the Canadian paint industry; but most of the problems will lie outside the field of raw materials, because these items are generally in good supply at reasonably steady prices.

9 ways to save money with Permutit Water Conditioning:

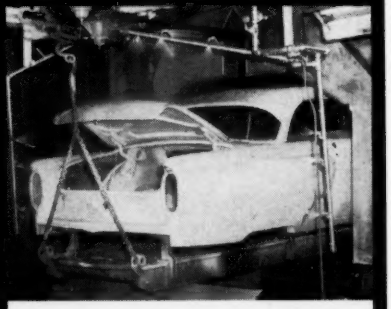


1 Protect boilers, heaters, piping. Prevent destructive heat-wasting scale by softening hard water. Prevent corrosion by neutralizing acid water and removing oxygen.

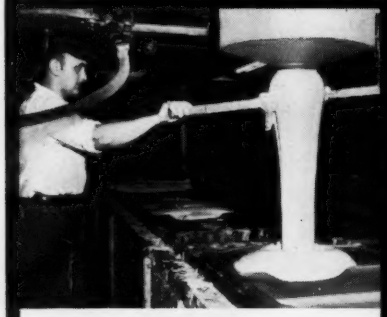
2 Cut soap and detergent costs. In maintenance cleaning, laundries, textile finishing . . . the soap savings usually pay for the entire cost of a water softener!



3 Protect cooling-water systems. Algicides eliminate organic growths that plug lines, stop flow. Softening water prevents scale that impairs heat transfer.



4 Get better finishes. Demineralized rinse water leaves no salt deposits when it dries . . . removes one cause of blisters in lacquers and enamels.

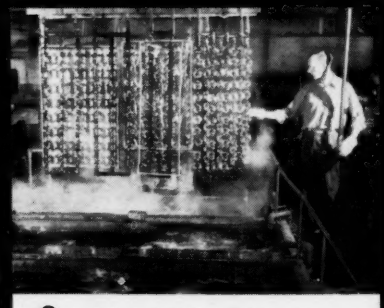


5 Up-grade chemical solutions. Removing salts from process water ensures uniformity, ends problems like pre-coagulation of synthetic rubber.

6 Up-grade low-cost nearby water. It often costs far less than buying city water! One steel mill cleans up sewage-polluted bay water for cooling hot strips, bearings, etc.

7 Treat water for re-use. A plating plant reduces waste from 72,000 gallons a day to 400 by simply treating and re-cycling rinse water!

8 Reduce process problems. Porcelain mixes made with demineralized water are easier to work and give better dimension control. Also produce a higher grade finished product . . . less rejects.



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Market Newsletter

CHEMICAL WEEK
April 6, 1957

To what extent is government foreign aid propping U.S. exports of chemical and related products? Last week, the Senate Foreign Relations committee released some figures that may serve as a good benchmark.

The aid program accounted for nearly 18% of the $1.02-billion export volume chalked up for chemical and allied products (excluding fertilizers) in '55. For fertilizers, the data was even more impressive: 36.6% of a total $91-million volume.

The data was pulled together for the committee by the National Planning Assn. in an analysis of the $2.8-billion fiscal '55 mutual aid program's impact on the domestic economy. (Aid shipments accounted for 1.3% of the chemical manufacturing industry's $14.1-billion total output; 3% of the $1.1-billion fertilizer production.)

If an economy-minded Congress doesn't sharply pare U.S. foreign aid, spending will take another big hop next year. The Administration will ask (sometime in May) for $4.4 billion for fiscal '58—in addition to last year's $3.7-billion authorization.

•

Further underscoring the increases in sulfuric acid supply in the U.S. *(CW, March 30, p. 64)* is Consolidated Chemical Industries' just-in plant at Le Moyne, Ala. The CCI (division of Stauffer Chemical) installation is a contact-type plant, has a capacity of 500 tons/day.

The latest addition, incidentally, completes Consolidated's "service facilities" for the entire Gulf Southwest, adds the Mobile area to existing sulfuric plant locations in Houston, Baytown, Corpus Christi, and Baton Rouge.

•

A raft of higher prices went into effect with the start of the second quarter last week, but a few items that were not advanced have some market followers wondering. Methanol, for instance. Demand for the synthetic material has been—and continues to be—quite strong, with heavy volumes moving into commercial and military outlets. Producers' stocks, too, are reported as generally amounting to only about a month's supply.

Chances are that there will be increases on methanol third-quarter schedules—if the current trend of business continues.

•

The copper market continues in a state of flux. Early last week, for example, custom smelters were divided as to what course prices should take. One posted a ¼¢/lb. advance (to 30¾¢), despite an earlier reduction in some sectors to 30½¢. Another, however, stuck by an unchanged 31¢/lb. quote. Major copper producers continue to hold the 32¢ price announced late in February (*CW Market Newsletter, Feb. 28*).

At week's end, domestic consumers were buying at a brisker rate, and export sales had picked up. Good-sized export lots moved at 30½¢/lb., up ½¢ from the previous smelter price to foreign outlets.

Consumption of refined copper will step up slightly in the second quarter, says the Commerce Dept.'s Business & Defense Services Administration in a late report.

The agency also notes that total supply (production plus imports) of the refined metal in the U.S. last year amounted to a shade less than 1.9 million short tons, which set a new high for the industry. BDSA also gave official verification that a "moderate surplus" developed in the final quarter of '56, chiefly because of lower-than-anticipated rates of automobile production.

•

Lower prices on wood rosins are in effect on all grades but water white. Hercules Powder clipped 10¢/cwt. off the items late last week. The reduction is said to be due to the price-softening in gum rosins.

Gum consumers have lately been rather shy, with some buying mostly replacement material. Producers expect a pickup soon, though; large-volume purchasers are showing signs of returning to the market.

•

Some resin prices in Canada are expected to go higher. Marketers are reportedly studying recent advances in U.S. prices of ester gums, maleics, and pure and modified phenolics, with an eye to following suit. Tags on other synthetics, particularly urea and melamine types, however, have softened, and the declines are being attributed to the coming on-stream of additional production facilities in the Dominion.

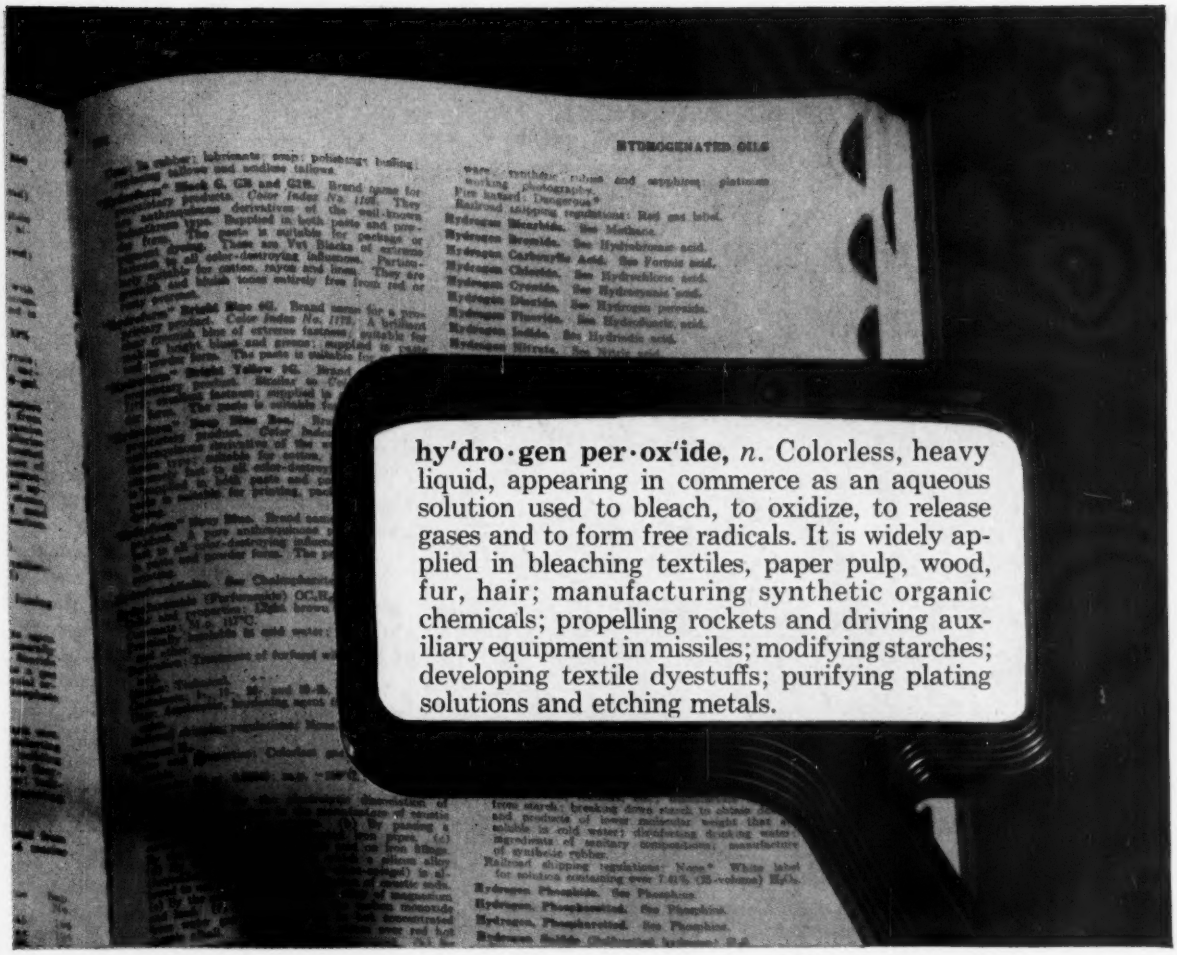
Phthalic anhydride supplies are freely available, and Canadian suppliers appear to be coping with some rough competition from European material. On the other hand, alkyd resin price trends are upward, due to increases in prices of vegetable oils.

SELECTED PRICE CHANGES—Week Ending April 1, 1957

UP

	Change	New Price
Barium carbonate, precip., bgs., c.l., wks., ton	$2.50	$106.50
Barium chloride, anhyd., bgs., c.l., wks., ton	4.00	176.00
Carbon tetrachloride, CP, consumers, dms., l.c.l., frt. alld.	0.0075	0.13
Ethyl bromide, tech., 98% dms., c.l., frt. alld., E.	0.02	0.46
Perchloroethylene, dms., c.l. or t.l., wks., ft. equald.	0.0075	0.1375
Salicylic acid, crude, fib. dms., c.l., frt. alld.	0.02	0.37
Trichloroethylene, dms., c.l. or t.l., frt. equald.	0.0075	0.1325
Urea, 46 pcs. N indust., bgs., c.l., t.l., dlvd. E., ton	5.00	125.00

All prices per pound unless quantity is stated.



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GUSTAV AHRENS: He hopes to make German films familiar again, as . . .

Agfa Returns to the U.S.

For the first time in about 15 years, the Agfa photo tradename is about to receive a big, yet careful, buildup in the United States. Purpose: to make Agfa products once again a major part of the U.S. photographic picture.

Agfa, an affiliate of Farbenfabriken Bayer that makes such camera specialties as film and sensitized paper (as well as cameras themselves), set up shop last week under a "back again in the United States" sign at the International Photo Exhibition in Washington, D.C. Seriousness of the firm's intent can be seen in the caliber of the shopkeepers: at the Agfa booth *CW* talked to Gustav Ahrens, director of sales, Dr. Wolfgang Eichler, technical director (both flew over from Leverkusen) and Achilles P. Germer, sales director of Agfa Photo, Inc., the just-organized U.S. distribution company.

Also at the booth are Agfa's principle wedges for forcing open the U.S. market. Being introduced for the first time anywhere are two new cameras and two new color films. These films are said to be faster (i.e., require less light to record an image) than color films previously available, give truer colors, sharper images, and be easier to process. One, Agfacolor CN 17, is a negative color film generally similar to Kodacolor. Agfa calls it a "completely universal" film. The photographer can load his camera with CN 17 and be prepared for whatever kind of picture he may take: color shots using daylight or artificial light. It can also be used to make black and white prints.

All at Once: Agfa's major pitch is not that CN has uncommon film speed (which at 32 ASA is the same as that of Kodacolor), or the fact that it is a combined daylight-artificial light type (which Kodacolor is also), but that a new developing process it uses produces sharper images, truer colors.

At the moment, however, nobody in the U.S. is set up to process either this or the other new Agfacolor film CU 18—a reversal film which, like Kodachrome, makes positive color transparencies, and has the above-normal speed (for color film) of 40 ASA.

Agfa is now negotiating with film processors. It will have one, or possibly two, signed up when it begins distribution this month.

Careful Entry: Its authorization of processors will proceed slowly—and, as such, be typical of the careful, precise way Agfa is moving into the American market. It is more interested in setting up firm foundations which will be good for the long pull than in getting fast distribution. It will not rush things, too, just to get nationwide outlets in time to get in on this year's lucrative summer market.

One reason for Agfa's wariness is the fact that it realizes the strength of its main competitor here, Eastman Kodak. Kodak has long dominated the photographic-supplies market in the U.S., is also in first place in worldwide sales. Agfa is no delicate child itself, however. A part of Farbenfabriken Bayer (and formerly part of I. G. Farben, the world's prewar chemical giant), Agfa runs a close second to Kodak in world sales—particularly if the film produced under the Agfa trademark in East Germany is included.

Fortunes of War: In 1927 Agfa bought Ansco, now a part of General Aniline and Film Corp. Films sold under the Agfa-Ansco tradename were familiar in U.S. photo stores throughout the '30s. When the war came, however, the firm was seized by the government. The rights to both tradenames in the U.S. were thus owned by GAF. GAF never used the Agfa name, however, so the German company had little trouble getting it back again when it approached GAF and the government in 1956. Since the war, Agfa has made Ansco's line of cameras (and will continue to do so, along with selling its own line of cameras) but has had no other relations with GAF.

While Ansco had rights to use the Agfa name in the U.S. and Canada, Agfa had rights to Ansco's name in

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*Trademark

other parts of the world, particularly Germany. In the agreement just reached, the two firms simply gave each other's name back. Ansco, too, received "other considerations".

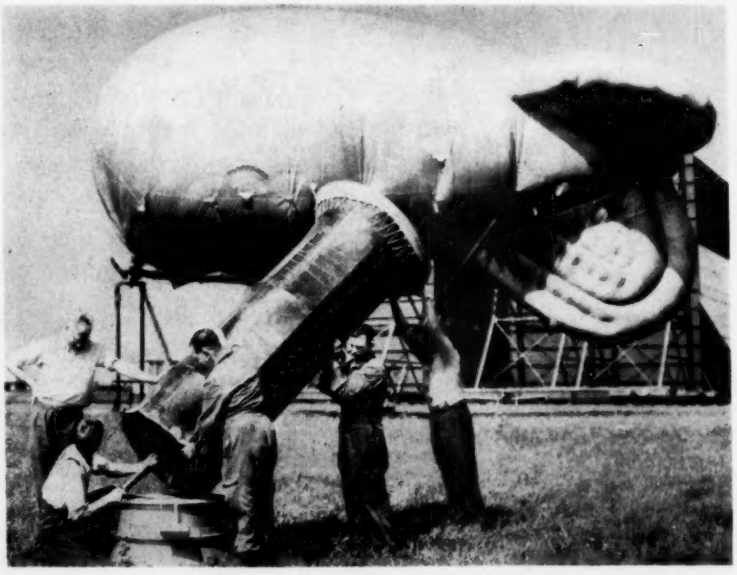
An analogous legal situation has kept Agfa out of Canada. But it is expected that the decision in the U. S. may presage a return to Canada. This will probably be effected by working through an existing Canadian distributor, rather than setting up a new company as it did in the U.S.

In recent years, Agfa has sold just one product in the U.S.: Copyrapid paper, used in office copying machines. This product was merchandised by manufacturers of the machines, and the Agfa name was not associated with it. Now Copyrapid will be brought overtly into the Agfa line.

Gradual Entry: Agfa's entire line will be gradually brought into the U.S. These include Agfacolor color films and Isopan black and white films, both for still and moving pictures, and also television film, developer and other photo chemical specialties, sensitized papers, X-ray film and magnetic recording tape, as well as an assortment of cameras and other photographic machinery.

If all goes according to plan, and Agfa hits the market in a big way, U.S. film imports should go up dramatically (although when Agfa's U.S. sales reach big numbers, it's probable that a plant will be set up here). Film imports have lately risen from 1955's 2 million rolls (worth $236,400) to 2.7 million rolls (worth $452,500) in 1956. Exports still far outweigh imports, though; in 1956, $6.5 million worth of roll film was exported.

Speed Race: Agfa officials don't expect the U.S. market to be easy to enter, and a stroll around the photo exhibition shows why. GAF's Ansco booth, for example, displayed new Super Anscochrome, a color film with a speed of 100 ASA. (Kodak's Plus X black and white film is rated at 80 ASA). Against this kind of product development, and Kodak's distribution and public acceptance, Agfa will need all the German ingenuity it can muster.



Balloon Helps Battle Bugs

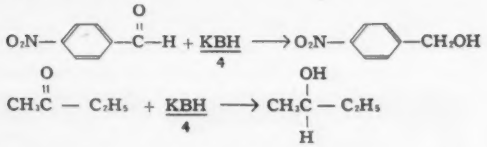
British agricultural experts at an agricultural research station in Rothampsted, Hertfordshire, have risen to the occasion in the fight against pests. By launching a balloon trailing an insect trap, they sample insect populations at various levels. The experiments are conducted to find out how weather conditions cause insects to be deposited on crops and how such conditions affect the rise and fall in insect counts.

THEY'RE TALKING ABOUT MHI POTASSIUM BOROHYDRIDE!

here's the latest on this high-yield reducing agent for carbonyl groups of aldehydes, ketones and acid halides

Briefly . . . MHI potassium borohydride (KBH_4) is a white crystalline solid with a purity of 99% and density of 1.175 g/cc. It is completely stable and can be handled and stored safely in air without loss of purity. MHI KBH_4 decomposes without melting in vacuum at 500°C with evolution of H_2. On hydrolysis, 1.66 liters of hydrogen are obtained from 1g of KBH_4.

Specific Reductions . . . of carbonyl groups of aldehydes, ketones and acid halides are fast and easy with MHI potassium borohydride. Without side reactions, without affecting other reducible groups present, without attacking olefinic bonds, this versatile agent goes straight to the heart of the specific reduction, like this:



Solubility. . . is 19.3 grams/100 grams water. Other solvents are water-methanol mixtures, in which solubility ranges from 13.0 grams/100 grams solvent for a ratio of 4 to 1 water-methanol solution down to 0.7 grams/100 grams solvent for methanol alone. It also dissolves in other water-alcohol mixtures and liquid ammonia. In general, solubility sharply decreases with higher alcohols. KBH_4 is generally insoluble in esters, ethers and hydrocarbons. It has a negative heat of solution in water of 6.3 Kcal/mol.

Equipment . . . Use conventional equipment, standard techniques. MHI potassium borohydride is easy and safe to handle.

Your Applications . . . can be numerous and profitable. MHI sales engineers will gladly provide complete information concerning KBH_4 and its application to your requirements. They will be happy to tell you, also, about how MHI Custom Reduction Service can carry out KBH_4 or any other hydride reductions for you on an economical basis. Why not call or write for details and technical literature. There is no obligation.

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Lever Leaves Little

Ceylon's soap manufacturers, claiming that dominance by Unilever's Ceylon unit leaves them only a little less than 10% of the soap market, have lodged a protest with the Ceylon Ministry of Industries. Lever Bros. (Ceylon) Ltd., the complaint says, has 90% of the total soap market, 95% of the washday soap market.

The protest asks not only curbing of Lever but also that all foreign firms with plants in Ceylon be circumscribed. The local businessmen say that Lever has taken advantage of the government's ban on imports of soap, has cut prices and is on the verge of expanding into other consumer lines.

The local Unilever unit has a capital of a little over $1 million in 500,000 shares, of which all but 6 are held by a British-registered Unilever holding company.

Specifically, the local soap makers ask that the government reserve 50-60% of the Ceylon soap requirements for local firms, and to order all cooperative trading organizations to handle only local brands.

Show-How in Austria

The traditional Missouri "Show Me" attitude has taken hold in Vienna, Austria. The Federal Chamber of Commerce in Vienna is contemplating the establishment of a center for the commercial painting trade to keep all craftsmen abreast of the latest developments in materials and work methods. It's claimed that the technological developments since World War II have somewhat confused even the licensed "master" painters.

The Austrian Federal Chamber of Commerce (a semi-government institution) now will buy samples of all paints and machines, gear and tools, and will collect data on application methods. Licensed masters are to be sole benefactors of the new center—since it's from their chamber dues that the center will be established and maintained.

Austria's chemical industry has already expressed great interest in the new center and has promised free samples for testing and teaching. It's expected that Vienna representatives of foreign chemical firms will also cooperate.

ATLAS AND BARR: Research is a 'must' if loaders are to be . . .

More than Mere Fillers

The recent prediction by the American Can Co. that some 400 million aerosol cans will be sold in '57—a ten-fold growth over '51—points up graphically just how quickly the aerosol industry has risen to major status in the American economy. And, that growth will more than likely continue to climb at a rate of between 20 and 30% each year.

Out to get a big share of this business is Chicago-headquartered G. Barr and Co., chemical specialty formulator and filler of aerosol products. Though the company was doing a $5-million business manufacturing and packaging private label cosmetics and drugs, before the emergence of aerosols as an industry, it has now almost completely switched its activities into the aerosol field. Here's how President George Barr and Douglas Atlas, the firm's sales vice-president, visualize the company's future role, as well as the role of fillers generally.

Barr figures the future belongs to fillers prepared to offer a variety of services, technical and otherwise. The "mechanics," Barr thinks, will be forced to quit, leaving fewer but bigger firms in the business. Many fillers, says Barr, got into the act at first only because they were good engineers and could design and operate a filling line.

Barr's own future will depend in large measure on two main areas of concentration: quality control and research.

Push on Quality: "There are two ways to compete—in price and in quality," says George Barr. "And price-shaving is suicide." It's this feeling that led the company to put in statistical quality control some time ago—at a time when there wasn't any great demand for such control on the filler's part.

Emphasis on quality control isn't a secret with Barr; the company has outlined its quality control procedure in a booklet which it sells hard to customers and prospects. Those firms that use quality control quickly recognize the soundness of Barr's setup; those that don't, admire it. The demand for such controls has grown steadily in the last few years.

But quality control isn't stressed only to impress customers. It's also the company's own insurance against mistakes. Nonsalable losses can be hefty when you fill a million units worth $250,000 each week. By checking cans (dents, etc.) and valves before putting them into the line, the company avoids later rejects, cuts down its own losses.

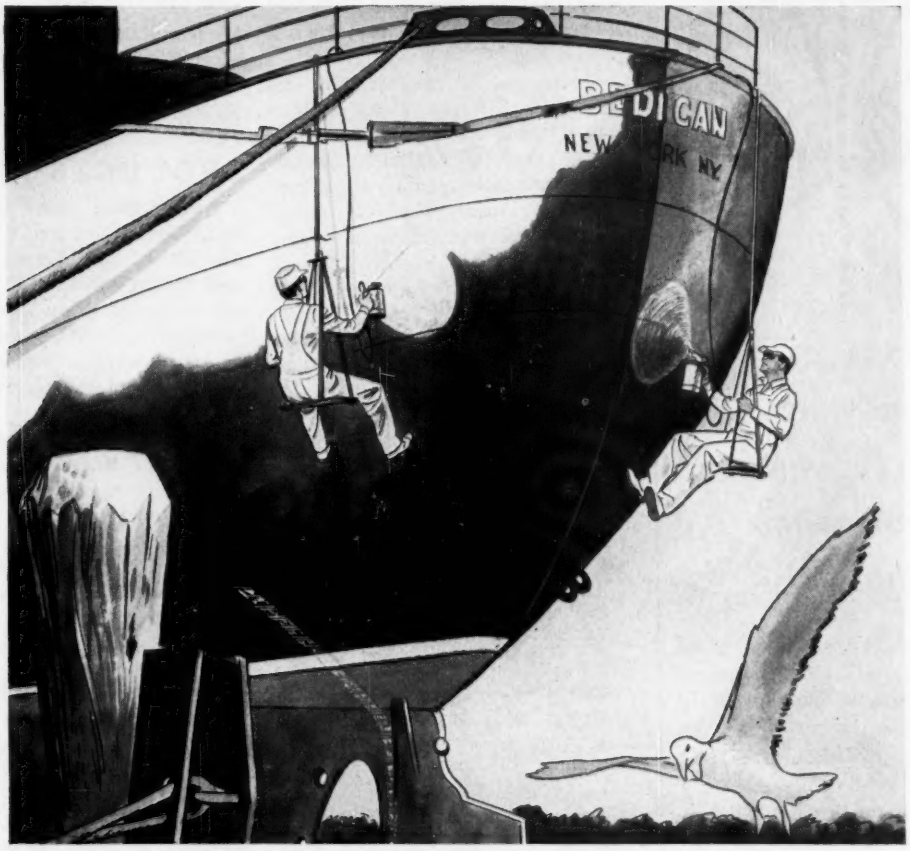
Plug for Research: Research, like quality control, is a good customer-getter. Working under technical director Morris J. Root are some 14 chemists, probably largest technically-trained staff of any filler. Labs are well equipped, too, with such devices as a spectrograph and gas chromatograph among the research equipment.

Both George Barr and Doug Atlas are chemists, which contributes to their stress on research. They feel it is insurance toward doing better jobs in the future, as well as a means of snagging new business.

Barr Co. claims to be the only filler with plants on both coasts and in the Midwest. The Midwest plant is the original; the New York plant went in about two years ago; and the one in Los Angeles about 18 months ago. Barr says three plants help draw customers—a customer who distributes nationally can do business with a single filler instead of three. And freight-rate economies are direct savings for the customer.

Barr doubts that many other fillers will gamble on multi-plant operations. And as to customers' getting into filling, he feels that is even less likely. The rationale: the big filler can generally make products more cheaply because he can keep his lines running all the time by switching products—as customers are not always able to. Also, there's more money in merchandising than there is in manufacturing, so most customers prefer to spend a quarter-million dollars on promotion, rather than for a new plant.

Switch in Emphasis: Though Barr originally started-out formulating private label cosmetics (it now fills about 70% of the cosmetic hair lacquers sold in the U.S.), the emphasis is



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changing. The company expects to expand heavily into other fields. One of the brightest spots for future growth is in pharmaceuticals, where the company feels that its quality control, research, and chemical knowledge will pay off well.

Specifically, here's what Barr sees ahead as near-future aerosol products and as those it will produce later: topical antiseptics, topical anesthetics, inhalants (vasoconstrictors), antibiotics, aerosol dye (foamy) shampoos, metallic hair tints (far better than those now available in non-aerosol form), griddle treatments (release agents) for home use. And there is also a whole flood of water-based products upcoming—among them an astringent antiperspirant.

Barr is sure the aerosol industry will continue to grow, and that its heavy investment in research will pay off handsomely, allow it to capitalize on the big boom in bombs.

Moth Mop-Up

Beginning next week the U.S. Dept. of Agriculture will launch a large-scale effort to eradicate the gypsy moth from almost 3 million acres of forest lands largely in parts of New York, New Jersey and Pennsylvania.

Aerial spraying of DDT at a 1 lb./pint of light oil/acre rate will continue from mid-April until mid-June. According to USDA, this will be the largest single aerial spraying job ever conducted in the U.S.

Approximately $5 million has been appropriated by state and federal governments for the control program this season in nine Northeastern states. Of this amount, more than half will be used in the federal-state spray program for the southern and western edge of the area long known to be infested with the gypsy moth.

The combined program calls for eventual complete eradication of the gypsy moth. Since a single DDT treatment is expected to be adequate for a particular area, plans for '58 embody spraying an area north and east of that to be sprayed this year.

Widespread Menace: There's good cause for concern over the menace posed by the gypsy moth. Caterpillar larvae of the moth, by devouring the leaves of forest and shade trees cause multimillion-dollar damage each year in a 38-million-acre area in the Northeastern states. Severest damage is done to oak, poplar, willow, birch and apple trees, but cherry, hickory, gum and evergreens are also affected. Big fear of the USDA is that if left uncontrolled, the pest could well threaten the hardwood forests from northern Maine to the Ozark Mountains.

PRODUCTS

Parting Made Easy: Barrett Division, Allied Chemical & Dye Corp., has just introduced an aerosol-packaged parting agent (mold release) for use in the molding of plastic and rubber products. It's called Poly-Lease 77, consists of a solution of low-molecular weight polyethylene in a mixed solvent system.

•

Black for Resistance: Alathon 5F polyethylene resin, a black, medium-density formulation has been introduced by Du Pont. The material is designed as a film- and paper-coating resin for applications where resistance to outdoor weathering is important. Price: 37½¢/lb. in truck-loads.

•

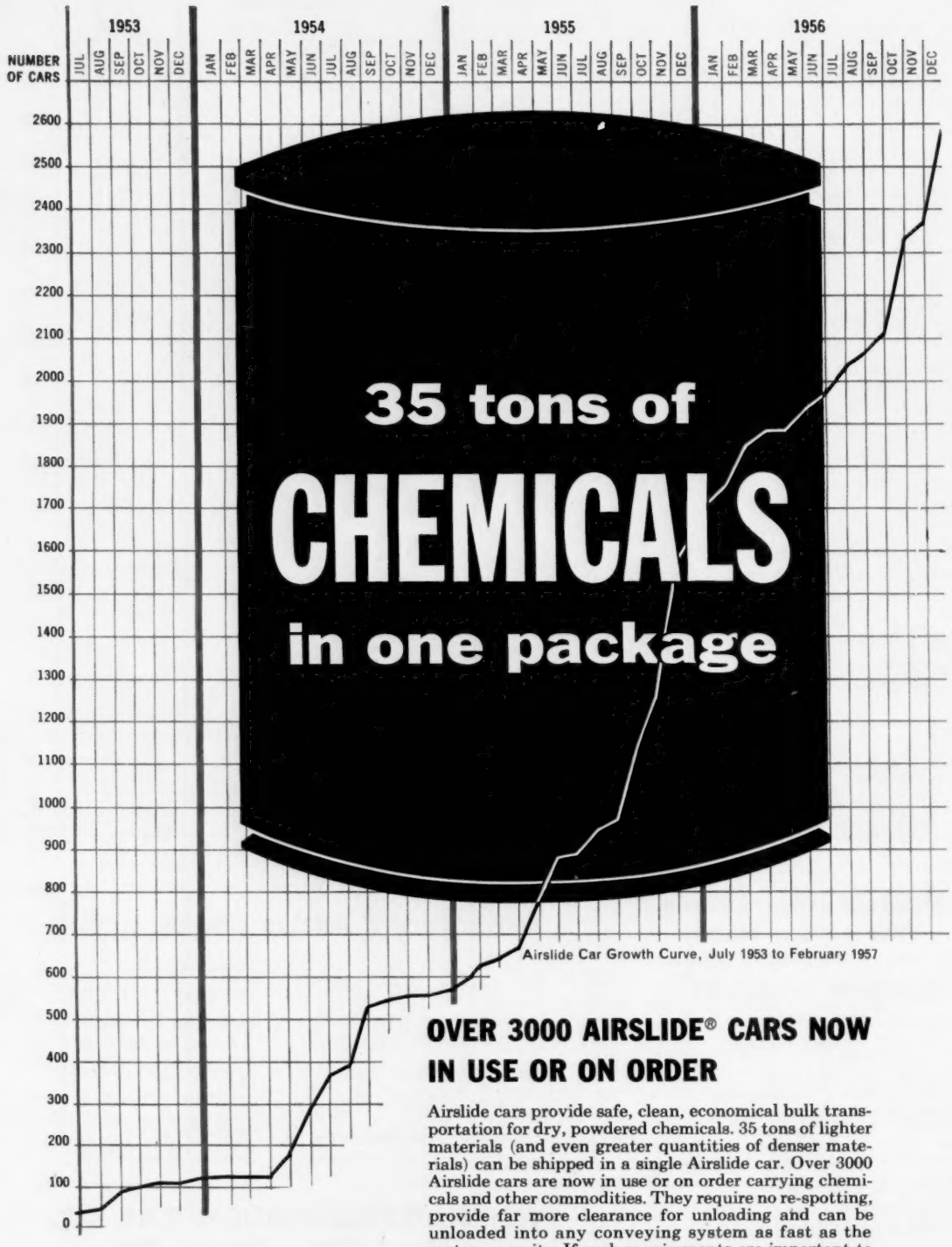
Paint Defoamer: A liquid antifoamer for use in processing butadiene-styrene latex-, polyvinyl acetate-, or acrylic resin-based paints has been developed by Swift & Co. (Hammond, Ind.). Of vegetable origin, the new defoamer is added during the pigment grinding process. It's called Defoamer 566.

•

On the Level: By competing with the dyes for the reactive sites on Orlon fiber, a new dyeing auxiliary called Hartex Retarder A is said to yield level, light-shade dyeing with cationic dyes. Hart Products Corp. (New York) developed the new material.

•

Start for Finish: Warwick Chemical Division of Sun Chemical (Long Island City, N.Y.) has signed a license agreement with Dow Corning Corp. for use of the Syl-mer name and trademark by itself and by those textile finishers, converters, mills and manufacturers with which it normally does business. Under terms of the agreement, Warwick plans to market its Norane silicone material to Syl-mer licensees and perform all quality control tests required by itself and by Dow Corning.



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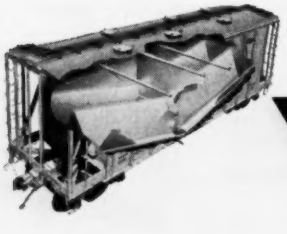

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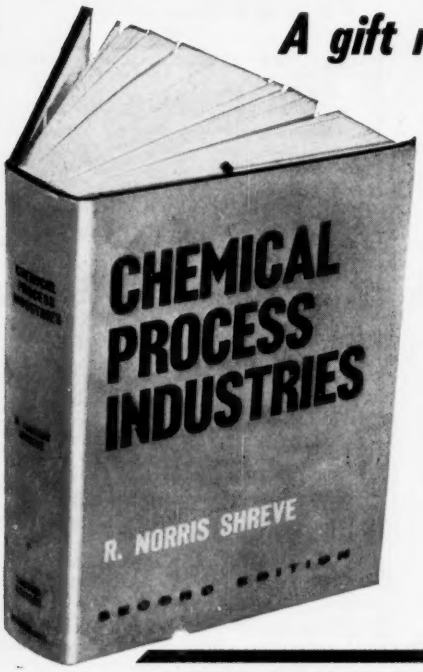

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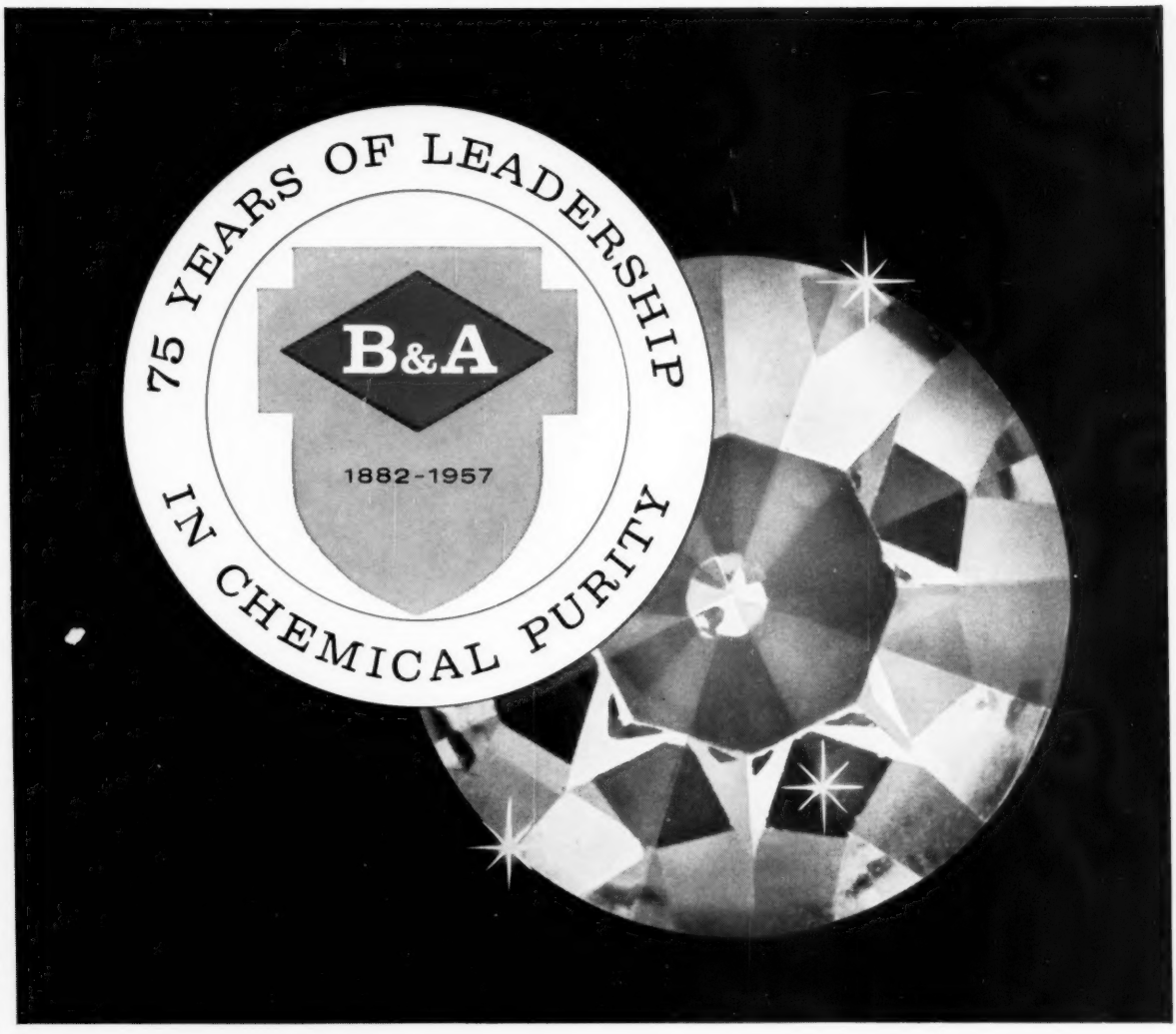

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